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GOOD POULTRY KEEPING

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GOOD POULTRY KEEPING

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THE ENGLISH UNIVERSITIES PRESS LTD
• 102 NEWGATE STREET
LONDON, E.C.1

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First Printed . . . 1947
Revised Edition . . . 1955
This Impression . . . 1957

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~~Printed and Published by the University of London Press, Ltd.,~~
London, by C. Tinsley & Co., Ltd., Liverpool, London and Prescott

FOREWORD

FOR some twenty years and more, through fair weather and foul, I have had the pleasure and privilege of being associated with the author of this book in the experimental work he has undertaken on behalf of the Southern Sub-Committee of the National Poultry Institute Advisory Committee. This work was mainly concerned with experiments in table poultry production, and the success achieved is in large measure due to the skill with which Mr. Fermor blended his extensive knowledge of Poultry Husbandry with the scientific enthusiasms of some of the members of his Committee.

As Francis Bacon wrote more than three hundred years ago, "Some books are to be read only in parts : others to be read, but not curiously : and some few to be read wholly, and with diligence and attention." This book I would place in the last category, for there is hardly a situation that may arise in the business of poultry keeping on which the reader will fail to receive wise guidance.

The book is called *Good Poultry Keeping*, but to me it will always be, like its author, *The Good Companion*.

E. T. HALNAN.

School of Agriculture,
Cambridge.

EDITORIAL PREFACE

THOSE who intend to take up poultry farming and those already engaged in its pursuit will find great interest in these authoritative pages. Mr. C. E. Fermor gives here the mature advice of a highly experienced poultry expert. He gives it in an up-to-date, practical manner, and his treatment of his subject will make an appeal not only to the student seeking a general outline of knowledge, but also to the established poultry farmer who wishes to improve his methods of management or desires to launch out into some branch of the industry of which he at present knows little or nothing.

Efficiency is of the highest importance in every phase of the agricultural industry to-day and nothing but *Good Poultry Keeping* will satisfy those who intend to make a living from this fascinating branch of work on the land. In this book Mr. Fermor not only tells us what to do, he also tells us—a thing very important indeed, especially for beginners—what to avoid.

It may interest readers to know that our author's experience includes a wide range of agricultural practice and also that for nearly twenty years he was engaged at Wye on experimental work in the production of Table Poultry under The National Poultry Institute.

S. GRAHAM BRADY-BIRKS.

AUTHOR'S ORIGINAL PREFACE

THINKING of the Poultry industry at the present time, and comparing it with the day when I set out in company with my sister to meet Mr. Hanson and learn from him the details of the new semi-intensive system of keeping poultry, it seems hardly possible that it was only some thirty-three years ago—not a long time in the life of an industry.

I remember the thrill with which we put up our new houses with the open fronts, their only protection from the weather being muslin shutters. The Wyandottes we kept at the time were fine birds, eggs were in plentiful supply, and the birds never knew a cold, despite the fact that their houses were at times surrounded by deep snow.

We were, of course, enthusiasts for the new system, and I think spent a lot of time with the birds, as they fed on the late Mr. G. A. Palmer's well-known but complicated mashies.

How we waited for the little pink covered periodical "Eggs" to arrive, and drank in week by week Mr. Tom Newman's advice, which to most of us, seemed quite revolutionary!

A lot of water has flowed under the bridges since those days, but it is well to pause at times to pay a tribute, albeit a silent one, to the Pioneers of what is now a very large industry in the country.

Most of what appears in the following pages has been said many times before, and I make no claim to originality, though perhaps its presentation is seen in a different dress.

It is made up in part from the notes which I have used for lecturing to students. At the same time the experimental work in which I have been engaged for some considerable time has afforded an opportunity of seeing

poultry problems from an angle not always available to the general farmer ; here again my experience has coloured what I have said in this book.

If I have unwittingly employed the ideas of other writers on poultry subjects, known and unknown to me, I offer here my apologies and acknowledgments. I owe much, of course, to others who have taught and written in the past.

To Mr. E. T. Halnan, M.A., Lecturer in Agriculture, in the University of Cambridge, with whom I have worked in happy collaboration for many years, I am indebted for reading the drafts for this book, and for allowing me to borrow information from many of his published works.

To my sister, Miss F. E. Fermor, I am indebted for the black and white illustrations.

If these pages should prove to be of some use to the new-comer to the Industry, or to any already engaged in it, the time spent in writing the book will have been well occupied.

C. E. FERMOR.

WYE COLLEGE

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WYE, KENT.

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LITERATURE

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- MOLYNEUX, H. *The Culling of Poultry.* Bulletin No. 59 (Ministry of Agriculture).
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- WILSON. *A Handbook of Poultry Practice.* Poultry World.
- THOMPSON, TURNILL & FELTWELL. *The Complete Poultryman.* Faber & Faber.
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- GRAY. *Diseases of Poultry.* Crosby Lockwood.

ROSE COMB



SINGLE COMB



MALE

PEA COMB



FEMALE



CHAPTER I

INTRODUCTION

Tracing the growth of the Poultry Industry from earlier days to the present time, and dealing with the different branches of Poultry Farming now practised.

POULTRY farming as we know it to-day is a very different thing from what it was before the Great War of 1914-1918.

THE PAST. To the older generation, it does not seem so long ago that such home produced eggs as were marketed came from small-holders, cottagers, and the general farmer. No attempt was made to treat the matter as a business. Fowls were either confined to a small run, which in a very short time took on a most unhealthy appearance, or they were allowed to range. In the latter case the farm yard was their home, where they had to fend for themselves to a great extent, their food, in addition to what they found, being a few handfuls of corn. The care of the fowls was usually in the hands of the lady of the house, and it was an accepted rule that the money, made by the sale of eggs and poultry, belonged to her by right.

This style of poultry farming was all very well as far as it went, there was no rent or labour to pay, and perhaps the corn was to be had for the asking. It must be said that an excellent egg was put on the breakfast table.

On these haphazard methods, poultry could not be made to pay, if overhead charges, such as rent and wages, had to be met, since the output of eggs per bird per annum stood at such a low level. As a matter of fact poultry keeping

was just tolerated by the farmer. His attitude, had he been asked what he thought of it as a business, would probably have been one of amused contempt. It is astonishing, after the great strides the industry has made in recent years, how this feeling is still found in some quarters. It is possible that the great number of failures on poultry holdings which occurred amongst ex-service men and others new to the work, who came into the industry just after the 1914-18 war, accounts in great measure for this indifference. Poultry farming at that time entered into a prosperous period. The industry advanced by leaps and bounds, perhaps too quickly for its good, for new ideas were often propounded and put into practice before being thoroughly tested. Tribute, however, must be paid to the pioneers whose spade work made the poultry farm what it is now. Men like Hanson, who gave us the large semi-intensive house with its alternate runs, revolutionised the industry to a great extent. Nor should one forget the Research Workers who have helped to make the path of the Poultry Farmer less hard.

Poultry farming is, of course, like any other business. It is absurd to enter into it without thorough knowledge and experience. Nor should it be a cause for wonderment if failures occur, where this most necessary precaution is not taken. It is true that if a man has the necessary capital and can afford the time, he may start in a very small way without a lot of previous knowledge. He can, as it is said, buy his experience as he goes along, profiting and learning by his mistakes, and having to pay for them. Many of our best poultry farmers have started in this way, but it is only a safe way if one commences with small numbers and is content to progress and build up slowly.

It is said that poultry farming is a one-man job. So it is if the size of the holding does not justify employing other

POULTRY
FARMING IS A
BUSINESS.

labour. This conjures up in the mind, work on Saturday and Sunday, Christmas day and Good Friday, with no time for anything else. It need not be as bad as that, for it should be possible for a man to get his wife or children to help him out occasionally, and so ease matters a little for him. To the man who wants a forty-eight hour week, however, poultry farming is not to be commended. Unless he loves a country life, unless he has a real interest and liking for the work, he had better leave it to those who feel that being one's own master, and having a stake in the land, is worth something after all.

To appreciate the extent to which the Poultry Industry had grown between the end of the first and the opening of the second world war, it is only necessary to point out that according to the Ministry of Agriculture's returns for England and Wales for the period 1937-1938, the estimated value of output in respect of poultry and eggs, amounted to £22,600,000, whilst the value of the corn crops was £12,910,000.

In the expansion that has taken place, the different activities of the poultry farm have tended to grow into businesses themselves. So that whilst there are still the large egg farms, breeding has become a specialized business and we have pedigree breeding establishments, and hatcheries. The production of Table Poultry is no longer the side line of the egg farmer who must get rid of his surplus cockerels. There are properly run table poultry plants. Fattening or conditioning stations relieve the producer of this skilled work, if he so wishes. Packing stations market both eggs and poultry for a small fee. Indeed, at the present time, as a war measure, the marketing of eggs through a packing station is compulsory, and for those who are apt to look on anything that savours of compulsion or co-operation with disfavour, it is well to remember the old adage, "United we stand, divided we

fall." The poultry farmer needs to take that axiom to heart as much as anyone.

It will readily be seen that with the establishment of these specialised organisations within the industry, the way of the general poultry farmer has been made easier. We shall, it is true, always have the genuine lover of poultry, who, working in a fairly small way, will want to keep the whole of his concern in his own hands. This is quite understandable. He gets a lot of satisfaction out of arranging the mating up of his breeding birds, and watching results. He likes to follow his birds through from day-old, until when he comes to trap nest his layers, he knows everything about them that there is to know. On large establishments, however, where the numbers run into thousands, it is best to limit one's activities to a single branch, or possibly to two branches. This is where the pedigree breeder or the hatchery is such a help to the egg or table poultry farmer. It can readily be seen that if he can rely upon a source from which to get hatching eggs, breeding stock need not be kept, or if he can get day-old chicks, incubation can be avoided as well. By this means a great expenditure of capital can be avoided, and time can be saved, which he can well use to advantage in his rearing or laying houses. There are now pedigree breeders in the industry well known for the quality of the stock they turn out, and the same can be said for some of the hatcheries. Rules and regulations are now such, that a prospective purchaser of hatching eggs or day-old chicks can find safeguards, and take the necessary precautions to ensure that he gets exactly what he is asking for. What branch would a new-comer to the industry wish to take up? Let us deal with each in brief, in order to help him to form an opinion.

He will quite obviously not wish to start in as a pedigree breeder, for this is a job which most certainly calls for years

of experience, and painstaking work.

THE NEWCOMER. It is the pedigree breeder who supplies the industry with hatching eggs, day-old chicks, growing pullets and mature stock. The ordinary poultry farmer goes to him for a change of blood, for a male bird to head his breeding pen which he hopes will provide him with pullets which will give him a higher egg yield, and for stock of an increased size for larger eggs. Now the pedigree breeder has to spend his time in constantly selecting or rejecting stock so as to mate up what he feels will give him what he requires. He is nble, in selling eggs or stock, to give details not only of the dam's production over a year, hut also the record of the sire's dam as well. All this makes for the heavy work of trap-nesting all through the year, with all that is entailed in the recording of the eggs, together with details as to broodiness and other characteristics of the bird. No, this is certainly not the work for the new-comer to the industry for some time to come.

The same thing can be said for the hatchery. The work of the hatchery is simply to provide day-old chicks to customers. These day-old chicks, usually hatched weekly by the thousands in large cabinet incubators, come from eggs the hatchery purchase from breeders well known to them for their reliability, and with whose stock they are acquainted. This work again is obviously the province of one who has long been engaged in the work of poultry farming and knows its many problems.

Egg production, to which most people turn when they are starting in poultry farming, does not consist simply in feeding the birds and collecting the eggs. Some idea must be known of the requirements in the way of food of the growing pullet, and the laying bird. Birds, if they are properly fed, will not be over-fed. One must know how to handle birds, to see when they are too fat or out of

THE EGG FARMER.

condition, and what steps to take to apply a remedy. The poultryman should be able to distinguish the layer that is paying its way from the non-doer, with a view to eliminating the latter. He should be ready with precautionary measures to keep down insect vermin, and be able to distinguish—and deal promptly with—the beginnings of an outbreak of disease. It is more than probable he will be buying in day-olds or young stock as replacements to go into his laying houses each season, and he must be well versed in rearing these young birds. So it will be seen, he has plenty to do, without necessarily taking on breeding or even incubation. One point in which research has helped the egg farmer is, that he is now able to buy with certainty pullet chicks. That is to say, research has given him the sex-linked pullet. If he objects to crossbred birds, science has again stepped in to help him with the sexed day-old. It is not so long ago that the purchaser of day-old pure bred chicks had of necessity to have both pullets and cockerels. He did not really want the cockerels, but with the heavy breeds at least, he had to wait for nearly three months before he could distinguish them properly, and get rid of the cockerels if he did not wish to fatten them himself. With only pullet chicks to deal with, his brooding and rearing equipment is halved, or alternately he can deal with larger numbers at one time, and so get through his rearing sooner than heretofore.

The activities of the table poultry plant will, as its name implies, be confined to the production of poultry for the table. This is an all the year round job of bringing birds along for consumption, at weekly or fortnightly intervals, practically all through the twelve months. Its advantages over egg production are that one's capital is turned over more frequently, and that the initial outlay in buildings and stock need not be so great. The work consists wholly in rearing and getting ready for the table, birds that will carry the

maximum amount of flesh in the shortest possible time. If it is desired to put on the market birds that have been conditioned by cramming, then that is the work of the skilled man and should not be attempted by the novice. If on the other hand a good chicken, fattened with a mixture on the trough is the desired object, it may well be tried by anyone wishing to engage in this branch of the industry.

It has been said that the production of table chickens is the most difficult work in poultry farming. To adapt a phrase much used at the moment, "It all depends on what is meant by the production of table chickens."

If the crammed bird is to be produced, if killing and marketing are to be done, then it does call for skilled labour. There is now only a very limited demand for crammed birds. Most rearers of table birds now produce "broilers" which are birds from $3\frac{1}{2}$ to $4\frac{1}{2}$ lb. live weight at about 12 weeks of age. These are reared intensively to produce the greatest weight in the shortest possible time. Day-old cockerel chickens can be bought from the pedigree breeder or hatchery. It is better to buy only cockerel chicks, these are cheaper than pullet chicks during February, March and April; but the prices rise at other times owing to the difficulty of selling pullet chicks out of season.

What of the small-holder or back-yarder? Here you have a man who will not be looking for a living from poultry alone. The small-holder will keep his cow, perhaps grow some corn or roots, and run a pig or two, in addition to keeping fowls. The back-

THE SMALL -
HOLDER.

yarder will be mainly concerned with providing his breakfast table, and possibly that of his neighbour, with fresh eggs. The stock of poultry in such cases will therefore not be large, and any replacements that may be required are likely to be purchased as pullets, partly or fully grown, or hatching eggs may be bought and set under broody hens. These broodies will not only bring out the chickens, but

OLD TYPE POULTRY HOUSE

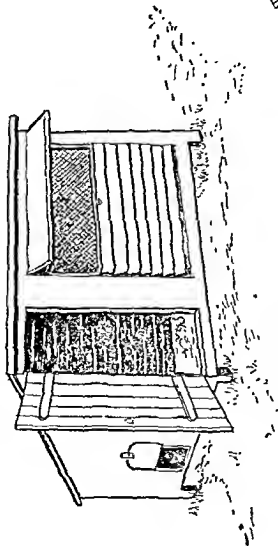


Fig. 1.—Usually associated now with Back Yard Poultry-keeping.

will also brood and rear them until they are old enough to fend for themselves.

This short survey of the Poultry Industry would be incomplete without some reference to poultry keeping on the general farm. It may come with surprise to many readers to hear that some 75 per cent. of the total eggs produced in this country now, come

THE GENERAL FARM.

from the general farms. There need be no cause for wonderment, however, when it is remembered that the general farmer possesses great advantages. He has a quantity of available ground. When he needs a change for the poultry he can range his birds over a wide area and, if not too thickly run, even where other stock graze. He also, in peace time at any rate, can find corn for the birds, and can run them over the stubble in the autumn. Many progressive farmers, seeing the advantages they possess, have made poultry a definite part of their farming activities, running them on up-to-date lines, and employing labour specially for the purpose. That it has paid them to do this, is evident.

It is often said that the poultry industry will be in the hands of the general farmer of the future. Be that as it may. The pedigree breeder and the hatchery will always find places in the scheme of things, and there should always be room for the man who, desiring a stake in his homeland, asks nothing more than to be allowed to work hard, and get a comfortable living for himself and his family.

Nothing has yet been said about the poultry holding itself. A satisfactory place always wants finding. It need not necessarily be a place already run as a poultry farm. In some cases it is better otherwise, especially if the area of the land is limited and has been heavily stocked. Sometimes it is possible to rent a small grass farm where poultry have not been run at all, instead of

THE POULTRY HOLDING.

having to purchase. The advantage of such a place is that there are often available buildings which, with little conversion, can be made to serve as Incubator House, Food Store, Brooder House and the like. This is naturally a saving in capital. The land should not be heavy clay ; a medium loam is best. Distance from a town or rail is not so important nowadays, when transport is so easy, and those wishing to do business will come to the farm. Every effort should be made to obtain a place where water is laid on. To be without this very necessary convenience can be very troublesome.

CHAPTER II

SYSTEMS OF POULTRY KEEPING

Free range, semi-intensive and intensive systems. Their advantages and disadvantages.

AFTER deciding what branch of poultry keeping to take up, it is necessary to have some idea of what system to use.

VARIOUS METHODS. There are various ways of keeping poultry. Some have been in use for a good many years, others are comparatively new, but all have by now had a good trial on commercial holdings. One cannot say that there is any *best* way, such a lot depends on the circumstances. Many general farmers are now using old barns and other buildings for running poultry on the intensive system, known as "Deep Litter"; or in cattle yards, then known as "hen yards."

No system should be condemned as a system, but rather condemnation should come from the use of any system, however good in itself, in circumstances which do not justify it.

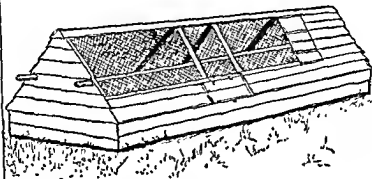
The various methods now practised may be grouped as (i) extensive or free range, (ii) semi-intensive, and (iii) intensive. These three groups can be further divided. For instance, the intensive system may include large laying houses, or it may mean the use of the laying battery.

It will be well to discuss these three systems in detail.

Free range brings into the mind's eye the large fields of the general farmer. One visualizes a portable house taking up to 50 birds, used simply for roosting and laying purposes, the birds ranging at will on the grass, and in the Autumn

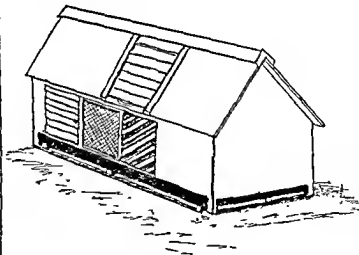
FREE RANGE

THE FOLD



FF

SUSSEX NIGHT ARK



FF.

Fig 2.—Above.—Popular type of housing for layers.
Below.—Useful for growing stock.

over the stubble. Provided that no harm is likely to come to these free-range birds from vermin, this is a good and cheap way of doing things. The house can either be the colony house, known as the slatted-floor house. The former has a wooden floor and is fitted with skids or wheels to facilitate easy moving. Because it is to be moved, it is ten feet by six feet, which, allowing for two square feet per bird, will give housing accommodation for thirty. The modern slatted-floor house will take more, requiring only one square foot per bird, and will probably cost less to purchase.

This system is simplicity itself. There is no danger of overcrowding, no danger of fouling the ground, and no expense necessary in the purchase of wire netting for runs. When the birds are on the stubble they will probably keep themselves for an appreciable time, and even on grass will pick up a lot in a day. The benefit to the birds themselves from unrestricted exercise is apparent.

When large permanent houses for birds on extensive range are erected in fields to which cattle have access, it will be found necessary to erect a fence of hurdles, or something similar, around them. This will allow the birds to get through and range the field, and will at the same time keep the cattle away from the house.

In some districts to allow birds to range at all will mean trouble from foxes, and this can be serious. So, farmers use what is known as "the fold system" to obviate this. Whilst folded birds are confined to a run, they are regularly moved in the fold to fresh ground. Since this needs a fair-sized area for satisfactory operation, if many birds are kept, it is included here under the extensive system.

The folding system, has much to commend it. There are various makes of folding pens on the market, but they all embody the same principle. The whole pen measures some twenty feet by six feet, being divided into a roosting-and-

FOLDING.

THE FOLD

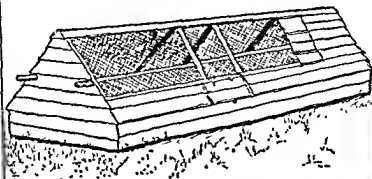


Fig.

SUSSEX NIGHT ARK

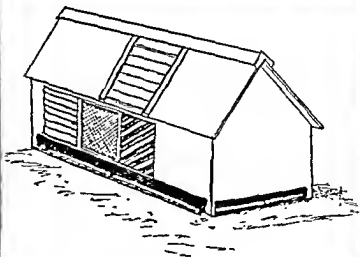


Fig.

Fig 2.—Above.—Popular type of housing for layers.
Below.—Useful for growing stock.

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When large permanent houses for birds on extensive range are erected in fields to which cattle have access, it will be found necessary to erect a fence of hurdles, or something similar, around them. This will allow the birds to get through and range the field, and will at the same time keep the cattle away from the house.

In some districts to allow birds to range at all will mean trouble from foxes, and this can be serious. So, farmers use what is known as "the fold system" to obviate this. Whilst folded birds are confined to a run, they are regularly moved in the fold to fresh ground. Since this needs a fair-sized area for satisfactory operation, if many birds are kept, it is included here under the extensive system.

The folding system, has much to commend it. There are various makes of folding pens on the market, but they all embody the same principle. The whole

FOLDING.

pen measures some twenty feet by six feet, being divided into a roosting-and-

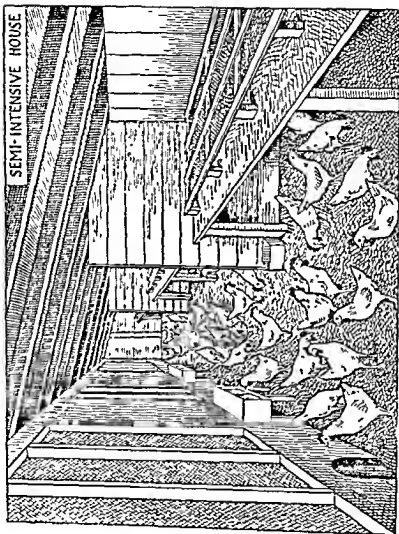


Fig. 3.—Birds can be kept in during inclement weather.

laying compartment, which takes up about one quarter of the whole space, the remainder consisting of a wire run. Some folds have the house in the centre instead of at the end. It is essential for purposes of moving, that the whole structure—whilst made strongly, and soundly built—should not be made of timber that is too heavy for handling. Some pens are so constructed as to be moved easily by one person. Whilst the roosting compartment will also contain the nests, the opposite end of the run will take the broody coop, water fountains and food hoppers. Most of these folds will hold from 25 to 30 laying birds. Owing to the difficulty of getting labour to move folds daily, this system is going out of use to some extent.

Besides being a protection against foxes the fold has other advantages to commend it. After the birds have become used to their sleeping quarters, there is no letting out in the morning, or shutting up at night. The poultryman who has his birds accommodated in a distant field will appreciate this, especially during the days when we have Summer Time.

From a general farmer's point of view it is interesting to note that where birds have been properly folded, the grass greatly improves in quality. Especially is this the case with poor pastures where birds will scratch out all the old grass. Some 30 birds will, it is estimated, void about one too of fresh manure per annum. From this it is possible to find to what extent any particular field has been manured.

The semi-intensive system is, as its name suggests, a compromise between the free range and the intensive system. It is in use on commercial holdings where the land available is limited. When this method of poultry farming was first introduced into this country some years ago, it was usual for the birds to be

THE SEMI-
INTENSIVE
SYSTEM.

accommodated in houses which would take a good-sized flock, and to each house were attached alternate runs. These runs were ploughed up when vacated and planted with arable crops. It was usual to keep the birds in one of the runs for about six months at a time. This idea has been modified in recent years, the flocks being reduced in numbers and the runs sown down to grass. Whilst the semi-intensive system at its first introduction to this country allowed for as many as 300 to 400 birds to the acre, a lower figure is now favoured, and houses are preferred that hold 100 to 150 laying birds. The semi-intensive method has advantages and disadvantages. The man who takes a lively interest in his birds, derives great satisfaction from seeing them happy and comfortable in their quarters in the most inclement weather. Provided precautions are taken against overcrowding, these well-littered, well-lighted, houses can be safely used for keeping the birds intensively when the weather demands it. The disadvantage of permanent erections is the possibility of getting the ground around the houses into so stale a condition as to be a source of danger to the birds. Every care must be taken to avoid this, perhaps the best way being the occasional removal of the top spit of bare patches and replacing with fresh earth. A careful watch must be kept also in large houses for any appearance of disease. It will usually be found that the egg yield in the winter will be higher on this system than from birds kept on free range.

The intensive system is now used because it saves labour; there is an increase of egg production in winter, when egg prices are high, as the birds are not so exposed to bad weather conditions; moreover it is easy to give artificial

THE INTENSIVE SYSTEM.

lighting in the shorter days and this, again, increases winter egg production. As will be realized, it is a system that can be practised with special advantage on poultry farms situated near the towns where land for the other systems is too

expensive to purchase, or not to be had at all. It is advisable to keep the birds in flocks of not more than 100 to 150. Whilst this will add to the cost of housing, it may be the cheaper way in the long run. Special care must be taken on this system. For example, overcrowding must be avoided at all costs, if feather plucking and cannibalism are to be avoided. Errors in feeding or management with this method of keeping birds may mean disaster.

Housing, where birds are to be kept intensively and semi-intensively, is of extreme importance. When con-

templating the erection of the houses, especially those of the large and permanent type, it is well to take trouble to ensure getting the best. Cheap houses can be both nasty and expensive in the long run. It should be particularly insisted that only seasoned wood should be used in construction. Very good second-hand houses can sometimes be picked up at sales at bargain prices. If these can be found fairly close at hand so as to obviate high transport charges, they are worth considering. The purchase of second-hand houses is frequently condemned. Providing the farm from which they come is known to be free from disease, and the houses are bolted, so that all the sections can be thoroughly cleansed and disinfected before re-erection, they should prove a good investment. Ventilation in these houses must be carefully noted. If the house appears stuffy night or day, then the ventilation is at fault and should be remedied. On the other hand, ventilation must not be overdone. A draught will mean colds. Perhaps the best way of ventilating a house is from above the birds. About thirty-six cubic feet of air space per bird should be allowed for intensively kept birds. Each house should be so placed that the maximum amount of sun can get into the interior. Ultra-violet ray glass should be used in the windows, which should be made to take right out, or let down. If a properly constructed sun parlour with a wire

EXTERNAL CHARACTERISTICS OF THE MALE BIRD

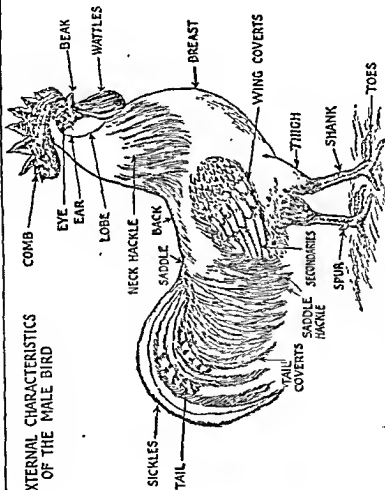


Fig. 4.—General Characteristics of the Male Bird.

CHAPTER III

THE HEN AND THE EGG

Being a description of the external characteristics of the bird together with details of the internal organs, including the digestive system and the reproductive system. Details of the composition of the egg and blemishes which occasionally arise.

It is generally accepted that our domestic fowl originated from the jungle fowl of India. By changes in condition, feeding, selection, and mating in the past, increase in size has been attained combined with greater fecundity. The jungle fowl would lay only about 25 eggs in a breeding season, and would weigh between three and four pounds. The present day layer will scale between five and six pounds and may lay up to 250-300 eggs in a year. She would in fact be rejected from the flock if she did not do better than produce 180 eggs annually.

Whilst no attempt can be made in a general book on poultry of this character, to go fully into the question of the science of the life (the biology) of the fowl, it is felt that some knowledge of the make up of the hen and the egg will be acceptable and advantageous to the poultryman.

Our illustration here (Fig. 4) is not, as a matter of fact, of a hen at all, but of a male bird. It has been used here to show one or two external characteristics (spurs for instance) that the female does not possess. The illustration practically speaks for itself. Notice, the

EXTERNAL
CHARACTERISTICS.

feathers and be able to distinguish between primary and secondary flight feathers. Look at the sickles, the saddle and the hackle feathers. It should be noted that in most breeds (The Campine breed is an exception), the males have feathers over certain parts of the body that are longer and more pointed than feathers in the same parts of the body of the female. Such features in animals (including birds) are termed "secondary sexual characters." In fact, secondary sexual characters are features of the body which though not themselves part of the reproductive system of the male or female, are nevertheless typical of that sex and are sufficient in themselves to distinguish it. The hackle, saddle, and sickles are "secondary sexual" feathers. The comb and wattles which are secondary sexual features are outgrowths from the skin.

The openings of the nostrils (external nares) should be noted above the tip of the beak. The ears can be found by separating the feathers behind the eyes. Notice the scales on the legs and the shanks, and the spur, peculiar to the male bird. The latter of horny character is an outgrowth of the bone.

All poultrymen should make themselves familiar with the make up of the fowl, if only as a matter of interest. It is useful, however, to help one recognise changes in any of the organs due to disease. When a bird dies, if it is not wanted for post-mortem examination, it should be dissected and examined, the appearance and structure of the various organs being noted. To do this is a very useful and instructional practice, if the time can be made available. The knowledge gained can be of great service.

In order to open a bird for examination, pluck the feathers from the breast, in fact from the whole of that side, and place it on a board, breast upwards, and fasten it down, say with nails. If the skin is lifted, one should

be able with a sharp pair of scissors to cut through it down from the neck to the cloaca or vent. Turn the skin right back and carefully cut away the flesh from the sides of the sternum or breast bone. Lift the sternum and after detaching the underlying organs with some blunted instrument, remove it. If the lining or membrane is then carefully removed the organs will be seen in position.

The heart, conical in shape, will be found in the middle of the body. The pointed end faces backwards. The lungs, red in colour, lie between the ribs behind the heart. If the skin of the neck is removed it will be easy to see the wind-pipe up to where it opens into the back of the mouth.

The liver can be distinguished by its reddish brown colour.

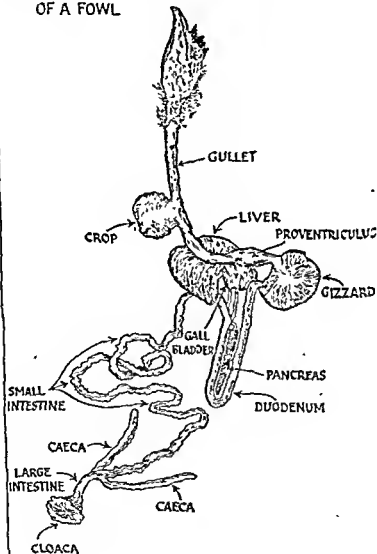
The alimentary or food canal, can be traced from the mouth to the cloaca or vent. The part of the food canal which begins at the back of the mouth is known as the œsophagus or gullet. It passes through the neck, opening into the stomach or proventriculus. The crop will be found as an enlarged portion of the œsophagus at the base of the neck.

The proventriculus or stomach comes between the œsophagus and the gizzard. It will be identified as being larger than the œsophagus and is reddish in colour. The gizzard is the fowl's grinding machine. It has thick muscular walls, as will be seen if it is cut open. The food is ground between the horny lining of the gizzard and the grit consumed by the bird, which will be found in the gizzard when it is opened.

The small intestine is a long tube extending from the gizzard to the cæca. These latter are a pair of blind ended tubes which mark the beginning of the large intestine. The large intestine extends from the cæca to what is known as the cloaca. This is a cavity into which the large intestine opens.

In the first loop formed by the small intestine, which is known as the duodenum, is a long gland, the pancreas. This

THE DIGESTIVE TRACT OF A FOWL



is a compact pinkish organ. The small greenish body against the liver is the gall bladder. This stores some of the bile which helps in the digestion of some of the fats contained in the food. A duct leads from the gall bladder to the duodenum.

If the bird's mouth is examined it will be seen that it has no teeth. Any food picked up in the beak is carried into the gullet by the tongue, and from there into the crop. This crop serves the purposes of a food store, and it is here also that grain undergoes a softening process from saliva coming from the glands of the mouth. When food passes from the crop into the proventriculus or stomach, gastric juices are released, which act on the food. In the gizzard the food by grinding is gradually reduced to a fine paste, the gizzard making up for the lack of teeth in the bird. As a paste the food passes into the small intestine, where the process of digestion begun by the action of the saliva and the gastric juices is continued by bile and pancreatic juices. Bile is stored in the gall bladder until required in the small intestine. The effect of all these juices is to convert the proteins, fats, carbohydrates and mineral salts into forms which can be absorbed by the small intestine. During the passage through the intestine the soluble contents of the food so broken down are absorbed through the walls of the intestine, the material which reaches the end of the food canal being the indigestible food residues.

DIGESTION.

In the male bird the essential paired organs of reproduction are the testes or testicles, which in a mature bird will easily be seen, one on either side of the backbone, just above the kidneys and below the lungs; the vas deferens or sperm duct is a tube leading from each testicle to the cloaca.

In the female bird, the organs of reproduction consist of an ovary and an oviduct. The ovary produces the yoke of the egg or ovum, and the oviduct forms the white of the egg and the shell. These may be seen after the organs

THE REPRODUCTIVE ORGANS OF THE FEMALE

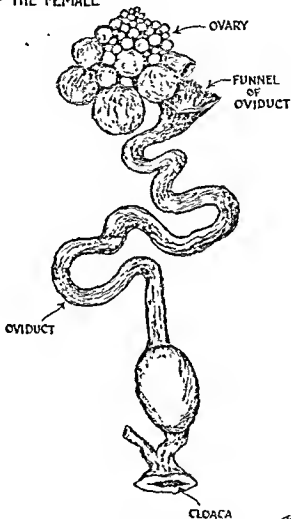


Fig. 6.

of the digestive system have been removed. The oviduct is the passage along which the eggs pass from the ovary to the cloaca. The yolk of the egg develops first, and this takes place in the ovary. The ovary will contain hundreds of very tiny yolks. These yolks will be found in all stages of development. Each yolk is enclosed in a sac or follicle, through which nourishment is obtained during development, such nutriment being supplied by the hen from the products of the food she has digested and being brought to the ovary by the blood. Each yolk

DEVELOPMENT. is surrounded by a thin skin known as the vitelline membrane. This can be seen if the egg is broken into a cup. It prevents the yolk mixing with the white. On the surface of the yolk of a fertile egg a small circular area, the "germinal spot," will be seen. This is the beginning of the development of the chick. If an egg is hard boiled and the white removed, a depression will be noticed in the inner surface of the white, and a corresponding elevation appears on the yolk; this is the place where the actual chick is developing. When the yolk becomes ripe or mature it breaks away from the covering of the ovary, and enters the mouth of the oviduct. There it commences its passage through the oviduct where various glands secrete the albumen—that is, "the white" of the egg. This is poured round the yolk, but owing to the rotation of the latter it becomes twisted at the ends, forming the chalazæ. About 40 per cent. of the albumen or white of the egg is supposed to be supplied as the yolk passes through the upper half of the oviduct.

After the yolk has passed some way down the oviduct the shell membrane is produced by the membrane-secreting portion of the oviduct, and a good deal more albumen is added. Here the egg is beginning to take on its final shape and size. It will have taken about three hours to pass through the first part of the oviduct and will remain from 12 to 18 hours in the lower portion of the oviduct. From

the membrane secreting portion it passes into the shell gland where the shell is laid on. Finally the complete egg is expelled through the cloaca. The shell of the egg when first laid is moist, but it soon dries. As stated elsewhere, if two yolks enter the oviduct at the same time a double yolked egg is the result.

The hen egg is oval in shape, the usual weight being about 2 ozs. The shell will be either white, brown, or tinted.

It is composed of carbonate of lime.

THE EGG. If a fresh egg is broken into a dish or saucer, the chalazæ and the layers of albumen can be seen. The chalazæ are attached to opposite sides of the yolk and extend into the albumen towards the ends of the egg, or may be twisted up close to the vitelline membrane. The chalazæ in the form of long threads, prevent any quick change in the position of the yolk and causes it to revolve on the long axis of the egg, keeping the germinal disc on the upper side, nearest the heat in incubation. The dense layer of albumen is transparent and, in a fresh egg can be seen, as well as the other two layers. The outer layer looks watery.

The shell membrane is double. In a perfectly new laid egg the shell is completely filled, but after it has been laid for some time and has got cool there is a certain amount of evaporation and the double membrane separates into two layers at the large end of the egg and the air-space is thus formed.

The composition of the hen's body, according to Cambridge data, is :—

| | | | Body including feathers. | Plucked carcase. |
|--------------------|----|----|--------------------------------|---------------------|
| Protein (or flesh) | .. | .. | 24.8% | 19.3% |
| Fats | .. | .. | 12.8% | 13.5% |
| Ash | .. | .. | 4.0% | 4.4% |
| Water | .. | .. | 58.4% | 62.8% |

The average composition of the new laid egg, according to Cambridge data, is :—

| | |
|-------------|-------|
| Yolk | 33.1% |
| White | 57.8% |
| Shell | 9.1% |

The chemical composition of the entire egg is :—

| | |
|---------------|-------|
| Protein | 10.9% |
| Fat | 10.5% |
| Ash | 0.9% |
| Water | 68.6% |
| Shell | 9.1% |

All poultrymen should know enough about the make-up of an egg to tell a stale one from a fresh one, or those in which internal condition makes it undesirable to market or use them. One should also know the reasons through which these undesirable qualities arise. The internal condition of an egg can be determined

CANDLING. by what is termed candling. This is holding the egg in front of a bright light, preferably in a darkened room. A strong light is necessary especially for brown shelled eggs. The contents of the egg will be seen by placing it in front of the light and below the level of the eye. Before doing this, the egg should be given a quick twirl. This action will cause the albumen and yolk to rotate and the interior will be more easily observed. Holding the egg below the level of the eye enables the air space to be seen more readily. In fresh eggs, the air space will only be small, about one-eighth of an inch in depth. A large air space is an indication of staleness or age. A movable air space means a broken membrane, which will allow the yolk to stick to the shell.

The yolk of a fresh egg if broken into a dish will look well rounded, whereas the yolk of a stale egg will spread out and look flattened. When candling, the yolk should be only

dimly visible as a shadow, and should not move far from its normal position.

The white of an egg should be firm and clear. It is said that a watery or thin white is an indication of staleness. Eggs with blood and meat spots are sometimes noticed on candling. Blood spots are frequently found on the side of the yolk, but meat spots are generally present in the white. These egg faults are caused by the rupture of small blood vessels in the ovary.

Sometimes an egg will be found which on candling appears to have a greenish tinge. If it is broken open an olive-coloured yolk will be found. Very often this is caused where the fowls on range have discovered and eaten shepherd's purse, or other weeds of a similar kind.

Shell-less eggs are produced as a result of not giving the hens a sufficient supply of oyster shell or limestone grit. Double yolked eggs are not the result of disease, but occur when two ova are passed from the ovary into the oviduct at approximately the same time.

CHAPTER IV

BREEDS AND BREEDING

An account of the various breeds in general use, with some old time favourites, and a few foreign table breeds. The use of cross breeds. Sex linkage. The management of Breeding Stock.

IN selecting a breed or cross-breed, the poultryman should obviously be guided by the experience of others. As a

farmer he may have his likes and dislikes. The colour or shading of a particular breed may appeal to him.

CHOOSING A BREED.

If he is not particular about making a living from his birds, he can probably indulge his fancy. Should he be out for business, however, then he will look to the popular breeds, for evidence of popularity will be found in ability to prove a money maker. True, some of the breeds described as fancy breeds now have been popular in the past, but they have been outstripped by others of greater utility value.

The table set out in this chapter makes no attempt to name all the breeds, but whilst giving those to be found on our holdings in this country, it must also include some that have been found useful for crossing. Others are named that have been of proved utility in the past, and might well come into their own again. Naturally, the poultryman in choosing a breed will have in mind exactly what branch of the industry he intends to take up. Certain varieties are excellent layers and nothing else and in these cases the cockerels do not prove a profitable proposition if fattened for the table, nor will the layer itself make much

at the end of egg production, and is generally not worth fattening. These layers are the non-sitting varieties.

Then there are the general purpose breeds, both egg producers and good table birds, very useful to one who, wishing to have an egg farm in the main, would also like to rear the cockerels for table. As layers some of the general purpose breeds run the laying varieties very closely.

Table-poultry farmers will look for breeds known for their table qualities, but will also want to choose from those which mature quickly and fatten satisfactorily.

| <i>Name of Breed</i> | <i>Country of origin</i> | <i>Comb.</i> | <i>Colour of flesh and skin</i> | <i>Colour of egg shell</i> | <i>Colour of legs</i> | <i>Remarks</i> |
|----------------------|--------------------------|--------------|---------------------------------|----------------------------|-----------------------|-----------------------|
| Rhode Island Red | America | Single | Yellow | Tinted or Brown | Yellow | General Purpose Breed |
| Sussex | Britain | " | White | Tinted | White | " |
| Leghorn | Italy | " | Yellow | White | Yellow | Laying Breed |
| Wyandotte | America | Rose | " | Tinted | " | General Purpose Breed |
| Plymouth Rock | America | Single | " | " | " | " |
| Buff Rock | America | " | " | " | " | " |
| Ancona | Italy | " | " | White | " | Laying Breed |
| New Hampshire Red | America | Single | | Tinted | Yellow | General Purpose Breed |
| North Holland Blue | Dutch | " | | " | White | " |
| Maran | France | " | | Brown | " | " |

| <i>Name of Breed</i> | <i>Country of origin</i> | <i>Comb.</i> | <i>Colour of flesh and skin</i> | <i>Colour of egg shell</i> | <i>Colour of legs</i> | <i>Remarks</i> |
|------------------------------|----------------------------------|-----------------------------|---|------------------------------------|-------------------------------|--------------------------------|
| Dorking | Britain | Single (except White) | White | White | White | Table Breed |
| Game (Indian) | Britain | Pea | Yellow | Tinted | Yellow | Table Breed |
| Game (Old | Britain | Single | White | „ | White | „ |
| Orpington | Britain | „ | „ | „ | „ | General Purpose or Table |
| Faverolle | France | „ | „ | „ | „ | „ |

It would probably not be an exaggeration to say that the first four varieties named above would be found on three-quarters of the poultry holdings in this country to-day.

Plymouth Rocks, Anconas, and Campines are not very numerous, although the first named is kept in large numbers in Canada.

The Minorca and Houdan, once popular, are not now in favour on commercial holdings.

The Dorking, Game, Orpington, Faverolle and La Bresse are kept for table production or for crossing for that purpose, though the Orpington is also by no means a bad layer.

Some mention must be made of one or two breeds from abroad which will be found on some holdings here and which are evidently giving satisfaction. Of such are the Dutch Barnevelder and Welsummer, layers of large rich brown eggs, and the North Holland Blue, a general purpose breed. The Belgian and French Table Breeds, Malines, Crève-cœur, and La Fleche are much favoured white flesh breeds on the continent, but not seen here.

Of all the breeds used on commercial holdings now, by far the most popular and numerous is the

WHITE LEGHORN PULLET



FE.

RHODE ISLAND RED PULLET

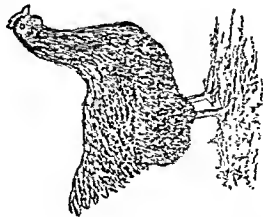


Fig. 7.

One of the most popular breeds.

Layer of large white eggs.

RHODE ISLAND
RED.

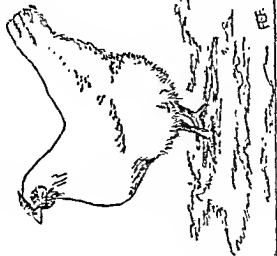
Rhode Island Red. The single combed variety is supposed to give better results than the rose combed group. It is of a rich chestnut colour, and has proved an excellent layer when kept on various systems. As a table bird it has good qualities, and if it were not for its somewhat high breast-bone and the popular prejudice in favour of white flesh, would command top prices. As it is, when crossed with Light Sussex females (a sex-linked cross)—sex-linkage is explained later in the present chapter—the progeny come with white flesh to about 90 or 95 per cent., and cockerels for the table from this mating are in popular demand in the best markets.

Until comparatively recent times the Sussex was not thought of as a layer but purely for its table qualities. It is still considered by most fatteners the best breed for the table. Now the Light Sussex variety, but not the others, viz., Red, Brown, and Speckled, has been developed for its laying qualities, and recent laying trials have shown its worth as a good layer of tinted shelled eggs. Its plumage is white, with black ticking on the neck and it has a black tail. As already stated, when crossed with a Rhode Island Red, it still retains its excellent table qualities and white flesh. This is the most popular cross for egg production.

The Leghorn belongs to the non-sitting light breeds. Of the various classes within the breed, the best known in this country are the White, Brown, Black. The White is by far the most numerous, though it does not hold favour with the egg farmer as much as formerly, having been ousted by the Rhode Island Red. The Black Leghorn can now be found amongst the leaders at laying trials. The Brown crossed with the Light Sussex produces sex-linkage, as does the Black Leghorn crossed with the Barred Rock.

The Wyandotte (the white variety of which was in such great favour a few years ago) seems to have suffered an

WHITE WYANDOTTE HEN



YOUNG PLYMOUTH ROCK PULLET

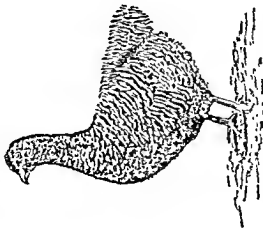


Fig. 8.

A good laying breed.

A good layer of tinted eggs.

eclipse. It is hoped that this will be only temporary for it is an excellent dual purpose bird, a prolific layer and by no means a bad table bird. The Silver and the Columbian are other types of Wyandotte, but are not as popular as the White variety. The Wyandotte makes a good broody hen.

The Plymouth Rock, or Barred Rock as it is sometimes called, has grey feathers barred with white. Though its egg production may not be as high as the breeds named above, it is a very useful layer and a good table bird. The Buff Rock is considered a better layer than the Plymouth Rock, in other respects it is similar.

The White Rock is now very popular in America as a cross for producing "broilers." Crossed with the New Hampshire it is giving very good results for this work.

Among laying breeds is the Aneona. It is very similar to the Leghorn in shape and has black feathering splashed with white.

The New Hampshire Red was developed in America as a quick growing table bird. It is rather a lighter colour than the Rhode Island Red. Is a very quick grower, reaching 4½ lb. in 12 weeks. It has "fast feathering", that is it feathers, as a chick, as quickly as the Leghorns; yet is a heavy breed from a table point of view. Crossed with the Light Sussex, it and the North Holland Blue, give the quickest growing chicks of any crosses. This is most important for broiler production, as the quicker the weight is put on the less the cost, per pound, of production.

It is quite a good layer, gives 100% sex linkage when crossed with the Light Sussex and should be more popular.

Of breeds usually used for table purposes, the best known—and as it happens they are all of British origin—

INDIAN GAME COCKEREL

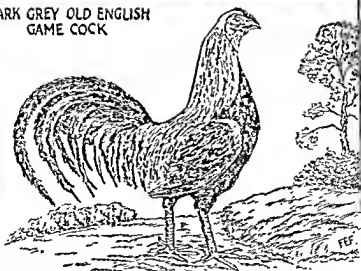
DARK GREY OLD ENGLISH
GAME COCK

Fig. 9.—Possess good table qualities.

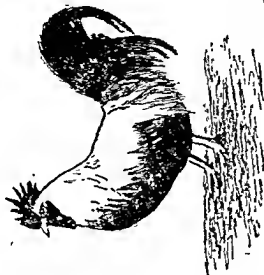
are the Dorking, Orpington and Game.
TABLE BIRDS. The Faverolle from France (a fair layer) is also an excellent table bird. The Dorking, Orpington and Faverolle are large-framed birds. A good table breed of smaller size, also of French origin, is the Bresse. It would be difficult to find any of these breeds run on commercial table plants to-day, though they might very well be seen crossed with more popular breeds. As pure breeds various factors react against their being used commercially, for instance lack of eggs in sufficient numbers, slowness in maturity, or perhaps their want of hardiness. Be this as it may, as first-class table birds they cannot be beaten, and where crossed with other breeds, tend to impress their excellent table qualities on the progeny.

The Dorking consists of several varieties, dark or coloured silver grey, white and cuckoo. The Silver Grey is the best known. This, when fully mature, makes a very large table bird of fine quality, reaching weights up to ten pounds. The Dorking has five toes, and the White variety has a rose comb, the others having single combs. The plumage of the Silver Grey is many coloured with black and white predominating in the male, and the female having a salmon-red breast shading into grey on the back and wings.

The Orpington owes its origin to Mr. W. Cook of Orpington in Kent. There are now several varieties, including the Buff, Black and White. The Buff Orpington has been the most popular in the past. It makes an excellent table bird when properly finished, and carries a large amount of flesh. As with most of these good table breeds, it does not do well on heavy wet soils. Where it is crossed with the Sussex a very nice table bird is produced.

There are several breeds of Game Fowls, the two chief ones kept in this country now for poultry purposes being
GAME FOWLS. the Indian Game, and the Old English Game. This is the breed kept in the

SILVER GREY DORKING COCKEREL



R.B.

BLACK RED OLD ENGLISH
GAME COCKEREL

Fig. 10.—Well-known Table Birds.

past purely for sport, being used for cock-fighting. Its fame in this direction, as far as England is concerned, is happily a thing of the past, cock-fighting being prohibited by law, and now only heard of occasionally when a main held in secret is discovered by the guardians of the law.

The Indian Game was for many years kept principally in Cornwall, and was known as the Cornish Game. As a pure breed it is slow to mature and a poor layer. It is a table bird *par excellence* as far as breast meat is concerned, and this goes for any Game breed. In fact there is not a better table bird despite its yellow coloured skin. Since the commercial aspect must, however, be considered by one wishing to make a living from poultry, the slowness of growth and the shortage of eggs militates against its use. When crossed with other breeds, the Sussex for instance, its value is at once apparent and quickness of growth is achieved in the progeny. One drawback noticed at Wye when the Indian Game (male) was crossed with the Light Sussex (female) was the rather high percentage of infertile eggs during the early part of the season. The Indian Game is a fine looking bird, the plumage having green black predominating, with some chestnut or crimson. Crossed with the Sussex about 85 per cent. of the progeny will carry white flesh. Incidentally this cross shows sex linkage. The Old English Game is a hardy bird ; it is an excellent table fowl and a better layer than the Indian Game. In crossing, though it will not produce such a large fowl as Indian Game, the well fleshed breast is more delicate in quality. It also has the advantage from a table point of view of possessing white flesh. The plumage of the Old English Game is varied red, blue red, mottled or spangled.

The Faverolles combine large size with early maturity, good egg yield, and fine white flesh. The most common in this country is the Salmon Faverolle. As its name implies the colour of its plumage is salmon or salmon

buff. Used in crossing with the Sussex, a very fine table bird is produced.

Of the other French breeds the La Bresse is perhaps the best known over here. There are several varieties, black, white, grey and blue. The White is
 FRENCH BREEDS. probably the most popular. It has been said in recent years that there is or would be, a popular demand for a table bird of about 2½ or 3 pounds. Should this ever prove to be the case then the White La Bresse with its fine bone, good breast, and excellent white flesh, should go far to meet the demand.

While these old breeds were very suitable for the large table birds required a generation ago, they are too slow growing and are too poor as layers for present economic requirements.

To-day a small bird is in greatest demand and price is a more important consideration than it was. Cheapness of production is, therefore, necessary and a quick growing bird is to be aimed at. Almost all table birds now are from Light Sussex crossed with the R.I.R., New Hampshire or North Holland Blue.

CROSS BREEDS

The question is sometimes raised, "Are cross breeds better than pures?" The point at issue really is, "Are they a better proposition from a commercial standpoint?" It will probably
 ARE CROSS BREEDS BETTER THAN PURES? be found that given good birds, a cross between two breeds will give stronger chickens, which will rear with lower mortality, they may grow quicker and hardier, the cockerels making good table birds, and the pullets equally good layers. In deciding to keep a cross breed a poultryman must remember that it would be unwise to breed from them. Pures would have to be kept for producing the stock. It is better not to go further than the first cross as a rule. It should also be

remembered in any sale of hatching eggs or day-olds, it is either pures or first crosses that are generally required.

Some possible crosses are :—

For Egg Production.

White, Black or Brown Leghorn crossed with a White Wyandotte.

White, Black or Brown Leghorn crossed with a Rhode Island Red.

White Leghorn crossed with a Light Sussex.

For Egg Production and Table Poultry Production.

Rhode Island Red crossed with a Light Sussex.

Light Sussex crossed with a Rhode Island Red. (Not Sex-linked.)

Rhode Island Red crossed with a White Wyandotte.

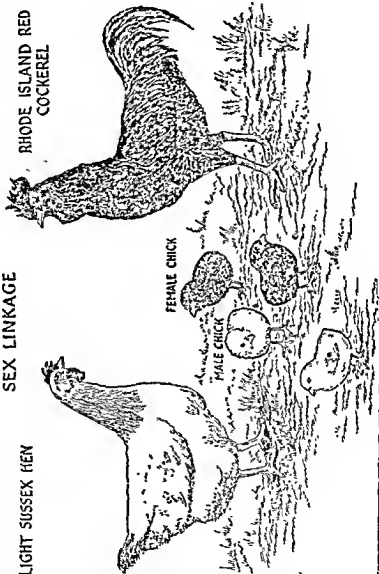
SEX LINKAGE

To research workers in poultry problems a great debt is due for many discoveries which have done much to improve and simplify the work of the poultry farmer. One of the most important of these in recent years has played, and will play a big part in the development of the industry. It is that by certain matings, characteristics come out in the progeny whereby the pullet chickens can be distinguished from the cockerel at day old. It requires little imagination to see what a big step forward this is. The commercial egg farmer simply has to rear his pullet chicks, disposing of the cockerels at once to a table holding, where cockerel and not pullet chicks are required. Brooding and rearing equipment is halved, or alternately more pullet chicks can be dealt with at one time, thereby shortening the hatching and rearing season, or allowing for the production of a larger head of stock.

Sex-linkage has the disadvantage that it depends upon crossing so that two pure lines must be kept to produce

SEX LINKAGE

LIGHT SUSSEX HEN

RHODE ISLAND RED
COCKEREL

the necessary breeding stock. Prof.

AUTO-SEXING.

Punnett at Cambridge, showed that breeds could be produced in which the

different sexes among the day-old chicks showed a difference in colour of down and, thus, the cockerel chicks could be picked out from the pullet chicks. The first breed which showed this sex-linkage within itself, now known as "Auto-sexing breeds," was made by crossing Barred Rocks with a breed, now seldom seen, the Campine. The progeny were inter-bred and the first auto-sexing breed produced and called, by Prof. Punnett, the Cambar; from the first syllables of the names of the breeds concerned. This breed was a poor layer of small eggs (in this taking after the Campiae), so an attempt was made to produce an auto-sexing breed which would be a good layer. This was done by using the Brown Leghorn in place of the Campine and the "Legbar" was the result. This breed was a much better one than the Cambar and, can be said to be the most popular of the auto-sexing breeds of which many have been produced from crosses with other breeds such as the Sussex, Welsummer, Ancona, Wyandotte and Rhode Island Red to name only a few.

So far no auto-sexing breeds have become very popular and egg production is not so good as in the R.I.R. or other more popular breeds. This seems a pity as they could be of great economic importance.

Since the introduction of these auto-sexing breeds it has been noted that some of the pure breeds which will sex link, when crossed, are in themselves, auto-sexing. Thus the North Holland Blues and the Marans, both really "barred" breeds, show a very marked auto-sexing quality; the pullet chicks, when hatched, being much darker in colour than the cockerel chicks. This is almost 100% correct in some strains or families. Some strains of Brown Leghorns and Rhode Island Reds also show differences in colour of chick between the sexes, and although this is not so marked as in

SEX LINKAGE

LIGHT SUSSEX HEN

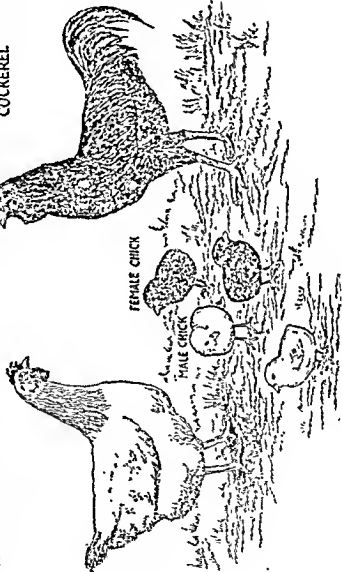
RHODE ISLAND RED
COCKEREL

Fig. 11.

AUTO-SEXING. the necessary breeding stock. Prof. Punnett at Cambridge, showed that breeds could be produced in which the different sexes among the day-old chicks showed a difference in colour of down and, thus, the cockerel chicks could be picked out from the pullet chicks. The first breed which showed this sex-linkage within itself, now known as "Auto-sexing breeds," was made by crossing Barred Rocks with a breed, now seldom seen, the Campine. The progeny were inter-bred and the first auto-sexing breed produced and called, by Prof. Punnett, the Cambar; from the first syllables of the names of the breeds concerned. This breed was a poor layer of small eggs (in this taking after the Campine), so an attempt was made to produce an auto-sexing breed which would be a good layer. This was done by using the Brown Leghorn in place of the Campine and the "Legbar" was the result. This breed was a much better one than the Cambar and, can be said to be the most popular of the auto-sexing breeds of which many have been produced from crosses with other breeds such as the Sussex, Welsummer, Ancona, Wyandotte and Rhode Island Red to name only a few.

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the cases of the Marans and North Holland Blues, it could be improved by breeding.

The Rhode Island Red is spoken of as belonging to the gold class. Its plumage of course is not gold but a brownish red, but it belongs to the gold class as does the Brown Leghorn, Indian Game, Dutch Barnevelder, the Red Sussex, Buff Rock and Buff Orpington. Likewise to the silver class belong not only such silver breeds as the Silver Wyandotte and the Silver Campine, but breeds in which the colour of the down is creamy silver, as the Salmon Faverolles, and the Light and Dark Dorking.

Sex-linkage is also obtained by mating a pure Plymouth Rock hen with a black cock or cockerel, say a Black Leghorn or Black Minorca. The distinction can be seen at hatching, for the cockerel chicks which will grow into barred birds will show a light patch at the back of the head. This will not be found in the pullet chicks which will grow up with black plumage.

Some Breeds giving the Sex Linked cross, are :—

- Rhode Island Red (male) crossed with a Light Sussex (female).
- Rhode Island Red (male) crossed with a White Sussex (female).
- Rhode Island Red (male) crossed with a White Wyandotte (female).
- Buff Rock (male) crossed with a White Wyandotte (female).
- Buff Rock (male) crossed with a Light Sussex (female).
- Brown Leghorn (male) crossed with a Light Sussex (female).
- Brown Leghorn (male) crossed with a White Wyandotte (female).
- Buff Leghorn (male) crossed with a Light Sussex (female).
- Buff Leghorn (male) crossed with a White Wyandotte (female).
- Wellsummer (male) crossed with a White Wyandotte (female).
- Black Leghorn (male) crossed with a Barred Rock (female).
- Indian Game (male) crossed with a Light Sussex (female).
- Indian Game (male) crossed with a Faverolle (female).
- New Hampshire Red (male) crossed with a Light Sussex (female).

DOING PROBLEMS

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reeding season, one problem is
e time or other : Should one

always insist on hens for the breeding
HEN OR PULLET ? pen or would pullets do as well ?

First of all, what exactly is meant by the terms hen and pullet ? For the purpose under discussion, by "hen" is meant a bird that has laid all through its pullet year, has rested and moulted, and is now ready for a second season's egg production. By "pullet" is meant a bird that has been reared, placed in the laying house, and is now going through its first year of egg laying. Actually a standard has now been fixed as follows:—

A pullet is a bird up to the age of 12 months.

A yearling is a bird from 12 to 24 months.

A hen is a bird over 24 months old.

Why, it may be asked, should the use of pullets for breeding ever arise ? What are the arguments in its favour ? The main reason is number of eggs. The hen has laid right through its first season, has done well, and the early breeding period comes along when it is only just through the moult. Eggs are in short supply. On the other hand the pullet is in its first flush of egg production and numbers are plentiful. This matter of short supply is especially a bugbear to the producer of table poultry, for in order to catch the early and best market for his chickens he will want to start his hatching operations in the fall of the year instead of in the spring. As a matter of fact the use of pullets for breeding by the table poultry farmer need not be deprecated, since all the chicks he will hatch, or at any rate the bulk of them, will find their way to the table. If he is a wise man he will keep one or two pens of breeding hens to produce the stock he wishes to carry on for future breeding. What are the arguments against using pullets for breeding ? The main one, of course, is the absence of any complete record of eggs laid, as the pullet is then only in its first year of production. Since egg records play a

very large part in the selection of stock for breeding, the absence of such records can be a serious matter in building up or maintaining first-class stock.

Having decided the question of hens or pullets, having earmarked the best layers either by inspection of records kept in the laying houses, or by other methods of identification, there is still

SELECTING.

the question of selecting the best from these good egg producers. There are certain factors which must not be ignored. In the first place the stock must be perfectly healthy and handle well. The birds should possess all the qualities of the breed to which they belong. The undersized must be rejected—and, indeed, the ugly coarse-looking bird as well. A bird that handles "light" will not be kept nor will one that lays small eggs. Any birds with crooked breast bones, roach or deformed back, or the like, which may have been left in the laying quarters until they have finished producing, will of course be rejected. In short, the good poultry keeper will see to it that the birds selected by him are the best of the flock in every respect, free from blemish and faults of every kind. The same care, and even more care if possible, must be taken in selecting the male bird for the pen. A related bird will certainly not be used. If the bird has to be purchased it should be got from a breeder of known reputation who can supply full particulars, including the egg laying records of the sire's dam. One will expect to pay a good price for the male bird, but when it is remembered that he is nine-tenths of the pen, that some 200 or 300 chicks may come from him, and that half the laying powers of a pullet may be inherited from the male parent, then, only the best should be sufficient.

No bird should be put into a breeding pen until it has been tested and satisfactorily passed the

AGGLUTINATION TEST.

Agglutination test for Baccillary White Diarrhoea. This applies to one's own

stock as well as purchased birds. Even if birds have been tested previously, they should be tested again in case of possible infection in the interim. Any birds obtained for breeding from outside sources should be purchased subject to their having passed the test successfully. Breeders of repute will sell their stock subject to this condition.

It is a common thing with some breeding establishments to require a young cockerel each year for mating with mature hens. Whilst there is a lot to recommend this practice, it is an error nevertheless to discard a male bird after it has proved its worth in the breeding pen during its first year. Having procured a good bird, it is worth while looking after him carefully. Especially should it be seen that he gets his food properly, for he will often neglect to take his share in his desire to see that the hens get all they want. The number of hens to mate with the male bird will be different in different cases. With the Light Breeds, Leghorns and the like, it will be fifteen or twenty. Perhaps it is better to leave it at fifteen. With the heavy breeds, such as Sussex, Wyandottes and Rhode Island Reds, ten or twelve hens are sufficient. These numbers relate to birds confined in wire runs. On some commercial holdings, where breeding birds are left on unrestricted range, several males will run with the flock, and on this system more hens can be run to the male than when they are wired in. Where several male birds are running in the same flock, care should be taken to see that they are brothers or have been brought up together. Otherwise they will fight and fertility of eggs may be upset. The main objection to flock mating is the inability to trace to any particular male a high percentage of infertile eggs. *On some holdings one male bird will be used in two pens of hens, being in one pen the first day, and in the second pen the following day.*

"Inbreeding," or the mating of birds related to each other is practised on some establishments. Whilst this

can be done, and is done, with marked success by skilled breeders, it is not a practice to be recommended to the ordinary poultry farmer. The establishment of what is known as a strain involves "inbreeding." If related birds are mated together they are more likely to breed similar characteristics than when unrelated birds are mated. Whilst the results desired are often obtained, "inbreeding" may result in failure and disappointment. The road to success may be a long one. So no useful purpose would be served in a book of this kind in attempting to discuss in detail the problems attendant on "inbreeding."

The management of the breeding stock should follow on similar lines to that used with the laying stock. Attention should be given to routine matters :—

MANAGEMENT. water vessels kept clean, careful feeding, fresh litter when necessary, and a watch kept for all insect life. No attempt should be made to induce the birds to lay before eggs are desired for hatching. Often the spurs of a second year male bird will require paring. This can be done by cutting off the ends with a sharp knife and then applying a caustic stick. Removal of the comb, or dubbing as it is called, can be quickly and efficiently done with the aid of sharp scissors. The comb can be cut off near to the head. The caustic is applied after washing the wound with cold water. After about a week the bird will be quite fit and fertility should increase. Often a large and heavy comb will obscure the sight of the bird. Thus dubbing the males of the large combed breeds is found an advantage.

It is well to make up the breeding pens in good time before the eggs are required for incubation, a month ahead being a reasonable period in which the birds can get used to one another. Eggs will be fertile in about ten days or a fortnight after mating. It should be noted that they will

remain fertile for about the same period after the male has been removed from the pen.

If a cockerel has been purchased from another establishment, it is advisable to buy subject to approval, and good class breeders are always ready to allow this condition. The cockerel should be kept apart from the other stock for a period. (See Chapter XII, on Diseases).

The time of hatching season depends upon the character of the business being done. If egg production is the object,

then eggs from the heavy breeds can be incubated in February and March, so as to produce pullets which will come into lay in the following Autumn. With the

THE TIME FOR
HATCHING.

light breeds hatching is usually done in April and the first week in May, for the same reason. Sometimes with both light and heavy breeds a batch or two of early chicks will be brought off in January. In table-work where batching is done nearly all the year round, the first lot of eggs for the incubator are usually required in the Autumn. Eggs intended for incubation should be collected two or three times a day during the cold weather.

There remains the question of housing the breeders. Where they are being kept in small units (i.e., one male to a dozen females), a good type of house is known as the Lancashire Cabin. This is a house with plenty of head-room and measuring nine feet square. It is divided into two compartments each to take one pen of birds. Provided with alternate runs, for each pen, each run about 45 feet square, the birds, by being moved from one run to the other when necessary, have the advantage of a change on to fresh ground.

In Figure 12 the first pen is in the first half of the house at A, with available runs at A¹ and A². The second pen is in the bottom half of the house at B, with runs at B¹ and B². If birds at A are using A¹ pen, then the birds at B should be using the run at B². To put the birds in pens

CHAPTER V

INCUBATION

Natural and Artificial. Hatching by the broody hen. Incubators large and small. Hot-water and hot-air machines. How to work the incubator efficiently. Treatment of eggs and the hatching chick.

HEN eggs take twenty-one days to hatch out, duck eggs twenty-eight days, geese eggs thirty days, turkey eggs

twenty-eight days, guinea fowls twenty-eight days, pheasants and partridges

HATCHING. twenty-four to twenty-five days. Hatching by natural methods is not now practised on large commercial farms. This is probably owing to the extra labour entailed, the difficulty of getting enough broody hens as required, and also because it has been found out by practice that equally good results can, with careful management, be obtained by the use of the incubator. Where only small numbers of eggs are required for hatching the natural method is still used. Many will remember one successful breeder on a large scale doing all his hatching in recent years in this way. A broody hen is one that is showing signs of a desire to sit on or brood her eggs. She will visit the same nest daily, remaining longer on the nest each day until she stays there altogether. If turned off the nest she will walk about with her feathers loose and ruffled. She will also make a "clucking" noise as if calling her chickens.

The first essential for natural hatching is the broody hen,

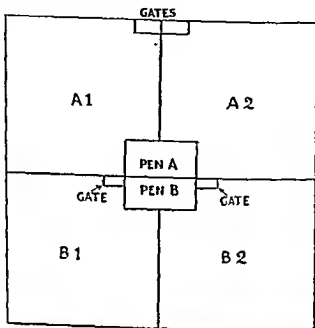
and it will be realized that a good number would be required on a large plot. These are THE BROODY HEN, not so readily found when wanted as might be imagined, but for the small man there should be no difficulty.

The poultryman must satisfy himself that the bird is properly broody and will remain so. Light breeds should not be chosen for the purpose, they are not reliable. Birds from the heavy breeds and their crosses should be selected, and hens as a rule make better sitters than pullets. The coop, or sitting box, for the broody should be about twenty inches square, a little more or less will not matter. Some people prefer a wooden floor to the coop, but a wire floor is now generally the practice. The coop must have a movable front. It can be placed in a shed, an open shed is an ideal place, or it can stand in the open, sheltered by a wall or fence, provided the spot selected is a quiet one. Care must be taken in making the nest. Hay is mostly used, or straw well broken up will do, and it should be so arranged that it looks like a nest, not just put in anyhow. The centre should be a little lower than the outside. Where the coop is fitted with a wooden floor it is a good practice to put a layer of earth under the hay or straw nest.

The broody selected must be a perfectly healthy bird and free from lice. If lice are suspected, she should be dusted with a little sodium fluoride a day or two before she goes into the coop. A few THE EGGS.

china eggs will now be needed, but if these are not procurable then the real thing can be used. Put these in the nest, and settle the broody into the coop as it is getting dark in an evening. A day or two will suffice to find out whether she is sitting well. If she is at all restless another bird had better be found, especially if the batch of eggs happens to be a valuable one. When satisfied that the broody will do, the eggs should be introduced, the china ones being removed at the same time, this work

PLAN OF BREEDING PEN



DRY MASH HOPPER

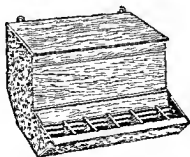


Fig. 12.—Dry mash feeding saves labour.

adjacent to one another will mean upsetting the male birds, and, possibly their damaging one another through the wire.

This type of house has windows at floor level as well as higher in the walls. It is fitted with dropping boards, dry mash hoppers, water fountains, and a range of nest boxes fixed up for trap nesting, because eggs must be recorded accurately for identification purposes. The wire netting used for the runs is usually six feet for the light breeds, and a foot less will do for the heavy breeds. Sometimes with the light breeds trouble is experienced by birds flying over the wire. A good preventive is to have a length of wire netting at the top of the six feet to turn inwards. If this fails the culprit must be caught and one or two of the feathers of one of the wings must be cut. This generally proves effective.

When birds are flock-mated it is a good plan to include an extra male with the hens. Often when cockerels are run together one of them will sooner or later get bullied to such an extent that he will be of no further use, and it is better to remove him. When this is done it will be impossible to replace him with a fresh bird because the newcomer will be treated in the same way.

FLOCK-MATING.

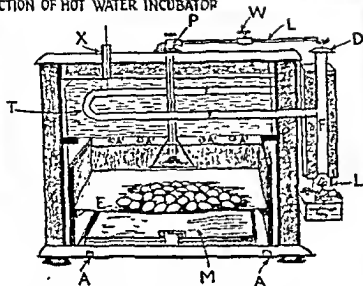
again being done at dusk. A dozen eggs is about the usual number set. More should not be attempted, especially if they are on the large size. They must be recently laid, of a good shape, and free from blemishes. Thin, or rough shelled eggs should not be used. The broody should be taken off every day for feeding and watering, preferably at the same time each day. Feed her by herself with grain, maize if available. If there is a dust bath handy, so much the better. Whilst she is feeding have a look at the nest, freshen it up, and if she has unfortunately broken an egg, remove all traces of it, and wash the remainder with warm water. It will soon be found when the hen has had sufficient food, and she will be guided quietly back to her nest. She will usually be quite ready to return, and in any case should not be driven or roughly handled. During the first day or two, fifteen minutes is a good time for the bird to be off her nest. Afterwards, if the weather is favourable, she may remain off for as long as half an hour. When several birds are sitting in a row of coops, it is the practice to tether them when they are taken off for feeding. This is done by means of a stake to which is attached a piece of string with a slip knot for passing over the leg of the bird. Fighting will then be prevented amongst them. At about the eighth day the eggs should be tested for fertility. Examine these by candle light or pocket torch after dusk when the infertile egg can easily be seen and removed. An infertile egg will look exactly like a new laid one, that is clear. The fertile egg that is containing an embryo chicken will have a dark shadow in the centre. If several broodies have been set at the same time, the eggs from all of them will be tested together, and when infertiles are removed, fertile eggs from two or three nests can be put together and one of the hens be dispensed with, or set on a fresh lot of eggs. Just before the eggs are due to hatch it is well to dust the hen with a good insecticide again, just as a precautionary measure. Do not throw away the infertile

eggs which were found on the eighth day. They can well be used by the pastry cook or the housewife. A sound reason for testing for infertility is to save time, and also if one is using one's own breeding stock, to be enabled to find the particular pen of breeders that are at fault and if necessary change the male bird. Hatching eggs laid on the holding should be marked with an identification number of the pen they come from. Hatching will generally begin on the twentieth day, if the eggs were fresh when set. Cold east winds may delay the hatching. Some people will immerse the eggs in water, about 105 degrees, a day before hatching, in the belief that it helps to bring the chicks out cleanly, but it is probably better not to disturb the hen at this stage. Leave her alone until the chicks are all out. If the hatch is likely to be a good one, it is advisable to remove egg shells at dusk during hatching provided the hen is quiet and tame. When hatching is prolonged, it is sometimes found that chicks stick to the shell and it is possible to assist them by carefully removing it, but in practice it is found that chicks so assisted turn out to be weakly and unthrifty birds.

Artificial incubation is no new thing. It was practised in Egypt 2,000 years ago by means of egg ovens. The hot-water incubator was the first type
INCUBATORS. successfully used in modern poultry farming, and is considered most reliable and capable of the best results. It is more expensive than the hot air machine of a similar size. Other types are the Mammoth, and the Cabinet machine. The number of eggs that can be incubated ranges from fifty eggs in the small unit machines to thousands in the sectional table mammoths and cabinet incubators. A clear idea of the proper working of an incubator is an absolute necessity for anyone embarking on this work.

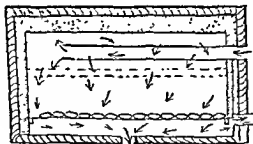
In the accompanying illustrations, Figure 13 (top) shows a cross section of a small-unit hot-water machine ; Fig. 13

SECTION OF HOT WATER INCUBATOR



REF.

SECTION OF HOT AIR MACHINE



REF.

Fig. 13.—When large numbers are being hatched the Incubator is practically indispensable.

(bottom) shows the same section of a hot-air machine of similar size.

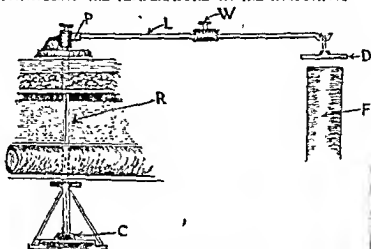
In the hot-water incubator the necessary heat to keep up the temperature of the water in tank T is obtained from the oil-burning lamp L. The heat passes up, and circulates through the flue F, so heating the water. Fresh air passes up through the holes in the floor A and passes above the eggs at A¹. The eggs for incubation are on a movable tray E.

In learning the details concerning the running of an incubator, one should get a proper understanding of the capsule and how it works. (Fig. 14 (top) for details of this part of the machine.)

THE DETAILS. The regulation of the heat in the egg-chamber is controlled by the capsule, which consists of two brass plates soldered together. In it is a small quantity of liquid, modified ether, or something similar, which boils at 99 degrees Fahrenheit. This temperature is a little lower than that required for hatching out eggs successfully. Water boiling at 212 degrees will generate vapour which, from its powers of expansion, will exert great pressure. For that reason a glass container will sometimes burst if there is no escape for the vapour. When the water is cooled it will take up about the same space as it did before being heated. On the same principle this capsule will expand as its contents become heated and vaporize. As the heat becomes less the sides will contract and lie close together.

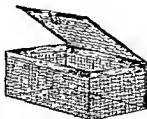
Now if Figure 14 is examined it will be seen that the upper end of the flue F has directly over the top of it a plate damper D, which, if allowed to rest on the top of the flue will stop any heat escaping, and it will all have to pass through the flue into the water tank. If the damper is raised at all, some, or all, of the heat will escape that way. The temperature of the water and of the egg chamber will depend on the amount of heat passing through the

CONTROLLING THE TEMPERATURE IN THE INCUBATOR



FF.

PEDIGREE EGG TRAY



FF.

Fig. 14.—Above.—A most important part of the machine.
Below.—Used for keeping track of special eggs during Incubation.

flue in the tank. Since the eggs being hatched require a constant temperature, it is essential that the damper should open or close if it varies. Something is wanted in the egg chamber connected with the damper to control it. This is where the *capsule* (C) comes in. Resting on a plate in the egg chamber it supports a rod R which in turn is connected with a lever L at the point P, and from this lever is suspended the damper. Assuming the egg tray has been taken from the machine for inspection, cold air entering will have lowered the temperature, the damper will be resting on the flue and the capsule will be flat. When the egg tray is put back and the drawer gets heated up again, the contents of the *capsule* will boil and the sides will swell out. This will lift the rod a little which will in turn raise the lever and the damper attached to it, allowing heat to escape from the lamp. In starting the machine up, it will be found that the heat may have expanded the *capsule* which in turn has raised the damper, but that the temperature of the egg drawer is not high enough. Here the sliding weight W comes into use.

ADJUSTMENTS.

If moved to the right towards the lamp the damper will be closed down on the flue, and more force will be required to raise it. Consequently the temperature will be increased in the water and egg drawer. On the other hand if too much heat is being registered the weight should be moved a little to the left, away from the lamp, so that the damper will open more easily and allow some of the hot air to escape. It will not be found necessary to move the weight very much in adjusting the temperature. When the required temperature is obtained, the weight should be clamped to the lever by means of the screw provided. Having once adjusted the heat in the drawer, it will be found to remain constant through the hatch, not varying more than a degree or two whatever the change in the temperature outside. If, however, it should become necessary to adjust the

temperature again, this should be done by moving the weight slightly to right or left as required. When getting a hot-water machine ready for use it must be seen that the tank is filled with warm water. If incubating is going on over a long period a little water will be required to be added to the tank from time to time to replace that lost by evaporation. Filling is done through a tube at X. Hot-water machines are also provided with a tube for emptying the tank which is situated at the side of the incubator. Above this outlet is another overflow tube which should be kept open when filling the tank and only closed when water begins to come from it.

A water tray is provided at the bottom of the machine (M) which should be three-quarters filled with warm water. Inside this tray is placed a perforated zinc tray upside down. A piece of wet canvas or hessian, with the sides tuck into the water is put over the zinc tray. Care must be taken to see that the canvas is always wet and that the water in the tray is replenished as required, or about twice a week. Both tray and canvas must be kept clean. A thermometer is provided for the egg chamber of both hot-water and hot-air machines, the water tank of the hot-water machine requiring a second one. The lamp must be filled every day (unless it happens to be a particularly large one). This work is always better done in the mornings, so that the lamp can be watched. Care must be taken to see that the wick is always properly trimmed. No oil should be left about in the incubator room. Thermometers should be tested before every hatch. This can be done by trying several together in lukewarm water and then in hot water. If all register alike, they will be correct.

The hot-air machine is probably in more general use than the hot-water one. This may be on the score of expense. The working is practically on the same principle in both machines. In place of the hot-water tank the air

is heated by the lamp and enters the machine above the egg tray, passing downwards and out through the bottom, heating the eggs as it does so.

The so-called Mammoth, or long table machine, is hardly ever used now. Its place has been taken by the much more efficient and space saving "cabinet machine." It is almost as easy to look after a 6,000 egg cabinet machine as a 60 egg machine of the old type. Thus, the cabinet has taken the place of all other types of machines on all but very small farms. Anyone wishing to set more than 300 eggs at one time would be wise to invest in a cabinet incubator.

The cabinet incubator is used to-day with the hatcheries and with those who do a large business in day-old chicks. Capable of taking many thousands of eggs this type is very economical in the room required to house it. It is usually run by electricity with good results both for heating, and for fans to give air circulation. In the cabinet, eggs are put on their pointed ends into trays which are arranged in tiers. Turning eggs in a machine of this capacity is not the long job that might be imagined. It is done with an external lever which rocks the groups of trays first at one angle and then at another or is automatic.

It is essential to have some special room, or kind of housing, for incubation. Where only a small machine is being used, it can be housed quite successfully in the poultryman's home. Cellars too have proved good incubator rooms. Brick or stone buildings

HOUSING FOR INCUBATION.

have often given better results than wooden erections. An incubator should not be housed in a building that gets very warm, so choose a place facing north if possible, and if the building be partly underground, so much the better. If a wooden incubator room is to be built it should have double walls with an air space between. To help in keeping the temperature constant the inner wall should be made of some cellular material for preference, a ceiling being made

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of the same material. Some people have the space between the walls packed with straw. The floor should be of rammed earth, or perhaps, to keep out vermin, cement would be better, laid to a depth of about twelve inches. A wooden floor, unless well laid, may encourage vibration to the detriment of the hatching eggs. Windows should be on the north side, and also on the east if possible, well up above the incubator. If shutters for the windows are provided, they will be useful when the time comes to test the eggs. There are various types of ventilation, which is a most important point in planning an incubator room. Probably one of the most satisfactory systems is where inlets are provided at floor level on both sides of the house. The inlet in the outer wall should not be exactly opposite that made in the inner wall. Both should be controllable by slides. The outlet is in the ridge of the building and this is provided with a cover to prevent a down draught. In the ceiling of the room there is a controllable outlet.

Where large size incubators heated from a coal-burning stove are being used, it is usual to house the stove in a small annexe attached to the incubator house, and made just large enough to take it. The heating pipes are then made to run through the walls from this annexe to the incubator-room proper.

In building an incubator house space should be provided for a table which will be required for holding the egg trays.

In the incubator room humidity thermometers are very useful, if not a necessity, for recording the moisture in the air. An ordinary thermometer for recording the temperature of the room should also be hung up. The room temperature should be between 60 and 70 degrees F., and the humidity between 60 and 70 per cent. If the air is too dry, the floor should be sluiced with water. Peat moss is sometimes kept under the incubators, in trays on the floor, and this is kept soaked with water when necessary. Incubators should not be placed close to the walls.

INCUBATING THE EGGS

All eggs for incubation should be marked with the number of the pen from which they are collected, and the date. Where trap nesting is done the number of the hen should also be marked on the egg. If a number of eggs in a hatch turn out to be faulty it will then be easy to trace the birds, or pen responsible.

Hatching eggs should be carefully chosen. They must be clean ; small eggs should be rejected, only those scaling 2 ozs. or a little over, should be used.

CHOOSING EGGS. Examine the shells, discarding all thin and rough shelled, or misshapen ones. The fresher the eggs the better, and it is wise not to use those over twelve days old. When collecting eggs for incubation from the breeding pens, store them carefully in a building in which the temperature does not vary a great deal. It should be between 45 and 50 degrees Fahrenheit. They can be laid out on a shelf or in boxes, and should be covered but not to the extent that no air can get to them. It is advisable also to turn them each day if possible. If not marked in any other way, mark each egg with a cross in pencil, to make sure it is always properly turned. After one turning all crosses will be showing, after the next turn no crosses will appear. In the very cold weather, eggs should be collected from the nests several times a day to prevent freezing.

When the time arrives to incubate, the temperature of the machine should be standing steadily at 103 deg. F. for hot air machines, 104 for hot water machines and from 99½ to 100 for a cabinet machine. See that everything is in order. The eggs can then be placed on the tray, the tray being removed from the machine for the purpose. Lay the eggs on their sides and do not pack too tightly or turning will not be satisfactorily done. When the tray is returned to the machine, do not close the door at once but allow the eggs to warm up gradually. The door may be closed after an hour or a couple of hours.

In the hot-air machine, the thermometer should now be hanging just above the eggs. Begin turning the eggs on the third morning. It used to be the rule to turn eggs twice, and cool them once a day by removing the egg-tray from the machine for about a quarter of an hour. This custom has been altered somewhat in recent years and poultry farmers now turn the eggs three or four times a day at regular intervals, but do not cool them

TURNING THE EGGS.

at all. The object of turning the eggs is to prevent the embryo sticking to the shell membrane. A broody hen sitting on eggs moves them about herself. Turning by hand three or four times a day would be a lengthy business if many eggs were being dealt with, and to save time most machines are now fitted with a mechanical turner. These are satisfactory in use if carefully handled. On some establishments eggs are tested for fertility on the sixth or seventh day, and are tested again for addled eggs and broken yolks on the eighteenth day, but the latter test is really not necessary. Another practice is to test on the twelfth day only, removing infertiles and such addled eggs, and those with broken yolks, as are easily recognisable. Eggs can be readily tested with an electric torch which is run under the bottom of the egg tray. Unless the windows in the incubation room can be darkened, the test will have to be made after dusk. If there is any doubt about the infertile eggs, keep a new laid egg handy when testing is taking place, and make a comparison. An addled egg will look cloudy and have a black spot adhering to the shell. When the yolk is broken a blood red line will be seen in the egg. Remove all the rejected eggs from the tray, disposing of the addled eggs and those with broken yolks by burning, but putting aside the infertile eggs for use in the kitchen.

Turning should stop on the eighteenth or nineteenth day, and it is a good practice not to open up the machine again until after the hatch is finished. Hot-air machines are

provided with a chick nursery immediately under the egg-tray, the idea being that as the chicks hatch out they come forward towards the light, and drop into the nursery tray. It has been found in practice, however, that it is easy to get the chicks chilled if they are in this compartment very long, as the temperature is often several degrees lower than that of the egg-tray where they hatched out. Access

to the nursery therefore is closed by bringing the egg-tray forward a little.

THE NURSERY. The nursery is not used at all unless the hatch happens to be an extraordinarily good one, and there is overcrowding on the egg-tray. It may then be advisable to use it when the hatch is three parts complete. In hot-water machines the chick nursery is in some cases situated at the top of the incubator. In that case the opening up of the machine for the removal of the chicks if there is overcrowding, cannot be avoided, and it should be done as expeditiously as possible. The only chicks that should be kept for the brooder are the strong healthy-looking ones that have hatched without any help. The custom that prevails in some quarters of helping weakly chicks out of their shells, whilst it may swell the numbers and increase the percentage hatched, is not to be recommended, for the chicks so helped rarely pay for the trouble taken, seldom living for more than a week or two, and always being a potential menace to the rest of the chicks.

When incubating in very dry weather, particularly when an east wind persists, it is sometimes advisable to put a bucket of hot water under the machine twice a day during the last week.

In transferring chickens from the incubator to the brooder house, they should be taken in a covered box (one lined with flannel that has been warmed if possible). Care must be taken to prevent them getting chilled whilst being removed from one house to another.

**TRANSFERRING
CHICKENS.**

It often happens that a special lot of eggs has been incubated with others and it is necessary to keep trace of the chicks that hatch from these. Maybe they are intended to introduce a change of blood into the stock. These special eggs should be put into muslin bags, or wire cages on the eighteenth day. When they hatch out they are toe-punched so as readily to be identified throughout their lives. The pedigree breeder in the course of his work has to do this in a large way, not only hatching eggs from his special hens separately, but also keeping the eggs from one bird apart from another. As soon as the hatch is over and the chicks have been removed to the brooders, the incubator should be thoroughly cleaned for the next batch of eggs. All remaining dead chicks, and shells, should be removed and burned. The hessian mats covering the egg trays and nursery tray must be thoroughly scraped, brushed, and cleaned in boiling water to which has been added a reliable disinfectant. The trays should be removed and treated in the same way, and the inside of the incubator well brushed out. Every care should be taken to see that this work is

properly done, and should, as a matter of routine, be done after every hatch.

ROUTINE.

All through the hatch, it is useful to keep records. This is essential if a good deal of incubation is taking place. A hatch may turn out disappointing and in looking for the cause of the trouble it is well to have in front of one a record of :—

- (1) The daily temperature of the egg drawer and the incubator room itself.
- (2) The daily humidity of the incubator room.
- (3) Number of eggs set.
- (4) When the testing was done, and the number of infertiles, broken yolks, addled eggs and dead in shell, removed.
- (5) Number of chicks hatched.
- (6) Number of dead in shell remaining.

All these points should be taken into account and examined if the batch has proved a bad one. Incubator temperature may have been too high, or too low, or may have fluctuated. Humidity may have been at fault, moisture too low. Eggs may not have been fresh, or have been badly stored. Infertiles may be traced to one particular pen and the male bird found at fault. Addled and dead in shell may come from weak germs and the hens in question be the cause of the trouble. Broken yolks may be the result of rough handling of the eggs, or vibration in the incubator room. The keeping of records will probably help to put a finger on the cause of the trouble.

CHAPTER VI

THE GROWING CHICK

Brooding—natural and artificial methods. The broody hen and its care. Different makes of brooders and their management. The after care of the growing chicks. Various ways of housing them and keeping them healthy.

REARING is one of the most important, if not the most important part of the poultry farmer's work. The rearing season, which comes in the spring months of the year, finds the farmer at his busiest, giving constant attention to his young stock all through the day, and ready to turn out at any time of the night if a change in weather conditions necessitates an eye to the brooders. It has been said—and with much truth—that the future laying stock is greatly influenced by the way it is being reared. The rearing period really runs from the day the chick is hatched right through to the time it goes into its laying quarters, or in the case of the table bird, up to the time it goes into the fattening coops. The first part of the rearing is known as the brooding period—i.e. the time during which the young chick must be provided with some warmth, either naturally from the mother hen, or artificially from oil-burning hovers, coal-burning stoves, hot water pipes and the like.

Coal burning stoves are now seldom used and the old water pipe brooders are only used for very large plants when brooding 2,000 chicks or more for broilers. Wherever it is possible, electricity has taken the place of all types because

of the great saving in labour and the reduction of fire risks. The Infra-red brooders are very efficient. Calor gas is very satisfactory where electricity is not available and brooders of this type, up to 500-chick size can be had.

The period when heat is required will change with the time of the year. Six weeks is the usual time, with five weeks a sufficient term in the late spring, when the weather is warmer. The second part of the rearing, known sometimes as the "carry on" period, is after the chicks leave the brooders, or the broody hen, and are transferred to grow on in colony houses, either on range or intensively.

It is the brooding period that will be dealt with here. Only people in a small way, domestic poultry keepers and the like, use the natural method of brooding by the broody hen. Not that there is anything wrong about it. If broody hens could be obtained in sufficient numbers and at regular intervals, the natural method of brooding would probably be more in use than it is. This supply of broodies when required, has however proved the bugbear on large holdings where much rearing has to be done, though, as stated earlier, one breeder in a big way of business did rear with broody hens up till quite recent times. The labour entailed in natural rearing is probably higher than with artificial rearing, though the latter system requires more experience and greater skill.

In deciding on the method of brooding to use, it must be remembered that if artificial methods of incubation have been practised, then artificial methods of brooding should follow.

In the natural method, as stated above, the broody hen will provide all the warmth required by the chicks. There is no risk of fire, as in the case of artificial rearing, and it is still the best way for the novice, for the broody hen will often succeed where the rearer himself fails.

The rearing coop should be a little larger than a sitting

box, about two feet square. It should slope from front to back, say about two feet high in front and 18 inches at the back. Unlike the sitting box, the rearing coop must have a wooden floor to facilitate

THE REARING COOP.

cleaning and to guard against vermin and dampness. This coop is also slatted at the front, the centre slat being removable; and it should be provided with a hinged shutter fitted with air holes at the top, so that the front can be closed at night. The hen can take up to a dozen chicks if she is a good sized bird. If she has had only a moderate hatch, say six chicks, and another broody has had almost the same number, then both hatches of chicks can be put together under one hen, but do not let her have more than 12 day-olds. Some breeders will allow the hen out with the chicks after a day or two, but the general, and probably the best, practice is to keep her cooped, moving the coop daily a short way to fresh ground. The grass where these chicks are being reared must be kept short. Where it is allowed to get long, it will often result in the chicks getting wet, with the probability of chills and casualties. When the hen is allowed out with the chicks, she will range so extensively at times that the chicks will get overtired and suffer accordingly. Day-old chicks will not require much to eat for a day or so, a little but often is a good plan. Stale bread-crumbs, or a little pin-head oatmeal, moistened in milk will be an excellent feed, and this at first should be given on a board, in or close to the coop. After a day or two they can be fed in front of the coop where the hen can see them. The chicks can then be put on to a mash made up by the farmer himself. This is best fed in a crumbly moist state. In addition a little corn can be given if desired (see under feeding). The hen must not be neglected and she should have a suitable wet or dry mash, with a feed of corn if preferred. Care must be taken to see that the food for the hen is so arranged

that the chicks do not get access to it. Clean water must always be available for hen and chicks, and grit must be supplied, that for the chicks being very small and of a kind specially sold for the purpose. Their grit may be sprinkled in front of the coop. A wire surround should be used so that the chicks cannot stray, and it should not be removed until they are turned a month old. Just when the hen should be taken away from the chicks will be a matter for observation. She will begin to tire of them and it will be found they are sleeping away from her. This may be when they are between six and ten weeks old, according to the weather. When this time comes the hen may be put back to her laying quarters and the chicks left in the coop for a time, before being transferred to the rearing house, or they may be taken there at once.

There are quite a lot of artificial methods and ways of brooding. The small unit brooder, a favourite with many, consists of an oil-burning hover fitted with canopy and capable of brooding from 50 to 150 chicks. This is usually accommodated in a small house to take

ARTIFICIAL METHODS.

one brooder. There is much to commend these small unit rearers. The house itself, usually about eight feet square, should be sectional so that it can readily be taken down and erected on a fresh site after the rearing season is finished. This change of rearing ground, whenever possible, is of great benefit to the chicks. It is often the means of checking an outbreak of disease which usually follows the use of the same rearing ground over an extended period. With the object of avoiding the use of tainted ground, where the removal of the house is not practicable, or a spare rearing ground is not available, it is now customary to have what is termed a "sun parlour" attached to these small unit houses. This sun parlour is erected in front of the house, and is almost two feet high, with boarded sides, wired framed top, wooden floor, or wire floor with

SMALL UNIT BROODER



CHICKEN COOP WITH RUN

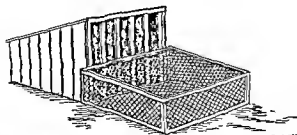


Fig. 15.—Above.—Capacity about 100-150 chicks.
Below.—For mother hen with her chicks.

dropping boards underneath. The chicks have the advantage of using the sun parlour when the weather is suitable, and if the houses are properly placed, of getting the maximum amount of sun at a time when it is very beneficial to them. Several of these hovers can be used in a large house with suitable surrounds to each hover to keep away floor draughts.

Infra-red brooders give off considerable heat in the form of rays. They are suspended above the chicks and need no cover or other covering, except, of course the brooder house. There are two types, the Bright Emitter which also gives light and the Dull Emitter which gives little or no light.

The former is the cheaper to buy ; but, otherwise there is nothing to choose between the two types.

Brooders used in intensive rearing sometimes obtain their heat from hot-water pipes which run along the whole range of the building and over which is fixed the canopy which can be lowered or raised as the occasion demands. Each unit will usually be wired off and fitted with a boarded surround some 18 inches or two feet from the ground to prevent floor draughts.

Some years ago the battery system of brooding was introduced from America. The cages on this system are built up in tiers, and obtain their heat, which can be regulated, from hot water pipes connected with an anthracite stove, usually accommodated in a small erection attached to the battery house. This system claimed a lot of adherents, and many good chicks have been reared in them. They are not so much in favour in some quarters now.

Some mention of the outdoor type of brooder, or foster mother as it is called, should be made. Used extensively some years ago, and perhaps looked upon as old-fashioned

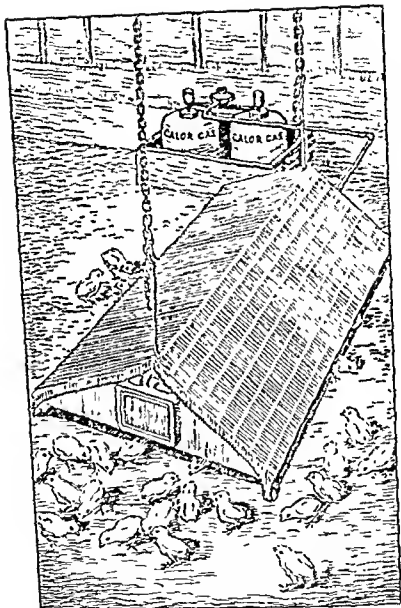


Fig. 16.—An Infra Red and large Calor Gas Brooder

now, it gave very satisfactory results, and can still be used with advantage where only small numbers are required. With this type of brooder it is often not advisable to attempt to rear the number of chicks recommended by the maker, or overcrowding, a great fault in chick rearing, may be the result. These foster mothers usually have two or three compartments. The door between the heated chamber and scratching compartment should be kept open so that the chicks can easily find their way in and out. The foster mothers must be put on level ground, and are easily movable to a fresh site. If many are in use, there is the disadvantage of having to do all the work required outside, such as seeing to the lamp, and cleaning out, in any kind of weather.

The fireless brooder is not in use on commercial holdings but satisfactory rearing can be done with it in a small way.

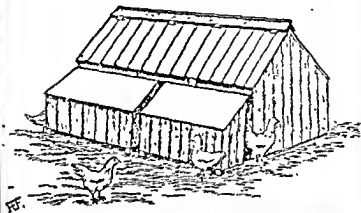
THE FIRELESS
BROODER.

It consists of a box with a lid, about 18 inches square and 12 inches deep. About six inches from the floor a light wooden frame rests on wooden corner

supports. The frame is covered with some light material or muslin on which rests a soft cushion. When the chicks are standing this cushion just reaches their backs. The heat generated by the chicks is conserved by the cushion. A nest of hay is provided for the chicks, and the number put into the brooder, about a dozen, have room to move around. Care must be taken to see that the chicks do not get overheated, and they must be well ventilated. Ventilation holes are provided at the top and bottom of the box. An opening provides for the entry and exit of the chicks. The writer has seen some excellent chicks reared on this system, but one must be prepared to spend a lot of time with them, teaching them the way in and out of the box, to obtain good results.

The management necessary for brooding chicks will be similar in many respects for all types of brooders. Take the

ARK SHEWING DRY MASH HOPPERS



INTENSIVE PYRAMID BROODER

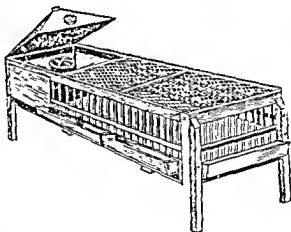


Fig. 17.—Above.—Hoppers need only be filled once or twice a week.
Below.—This type of brooder gives excellent results.

MANAGEMENT. question of heat for instance. The day-olds will have been brought from an incubator where they may have been confined in a temperature of about 101 to 102 degrees. If they are to be kept free from chilling, the temperature of the brooder must approximate to what they had in the incubator. Lamps or other hatching appliances are therefore adjusted so that the temperature of the brooder will stand at 95-100 degrees before the chicks are brought in. The temperature is then lowered at the rate of about 5 degrees a week. Some brooders have a thermometer provided upon which the rearer will rely. Other rearers prefer not to use a thermometer at all, depending on the chicks themselves to let them know when there is too much or too little heat. In the former case, they will find the chicks getting away from the lamp; in the latter case, they will be crowding towards it, and showing signs of distress. Oil lamps should always be cleaned and trimmed and any adjustments made in the morning. The temperature should never be altered at night unless this is absolutely necessary, and then the brooders should not be left until the lamps have been watched for half an hour. The flame will sometimes draw up after it has been adjusted.

In all types of brooders the chicks must be carefully attended to for the first few days. They should be kept close to the heat the first day and not fed, allowing them to run out if they will, but returning them soon afterwards. They must then be taught to come out and feed and return to the heat as necessary. The food and water should be kept close up to the brooder at first, gradually moving it a little further away each day. As with naturally-reared chicks, their first meals should be on a board, a little and often, to which they should be encouraged to come by a slight tapping on the board. After the first day or two the regular meals can be started, dry mash always before

ATTENTION.

WOODEN FEEDING TROUGH



DRINKING FOUNTAIN



EARTHENWARE TROUGH



FEF

Fig. 18.

them if preferred, or a crumbly mash four times a day at first, and then reduced to three meals. (Rations for brooder chicks will be found under "feeding.")

All the different types of brooders must be kept scrupulously clean, together with the feeding troughs and water fountains ; the dropping boards, if used, must be attended to ; and the overcrowding of chicks must be carefully avoided. A check at this important stage of the chick's life must be avoided at all costs, and it is essential to prevent the chicks being in a draught, which will lead to a chill. For this reason where floor brooding is practised, it is the rule to have a wooden surround to the hover for a few days to prevent the chicks straying too far. Even after this, some sort of protection should be provided for older birds if floor draught is suspected.

The sexes of the light breeds should be separated by the time they are due to leave the brooders. The cockerels will be easily identified by the development of the comb.

REARING (THE GROWING ON PERIOD)

The term rearing here refers to that period between the end of the brooding period, and the time when the pullets are matured and about to be transferred to

their laying quarters, or in the case of table birds, when they are gathered up to go into the fattening cages. The age

at which chicks will leave the brooders depends upon the time of the year and the weather. If the weather is favourable, and there are prospects of its continuing to be so, and if the chicks have feathered well, then it is quite safe to do away with heat when they are six weeks old. Early in the year it is better to leave them in the brooders until they are eight weeks old, or even nine weeks if the weather happens to be very severe. Towards the end of the brooding the chicks will be gradually broken to the new conditions they

are to experience, the lamps will be much lower than earlier on in the brooding, and in the last week they will be out all day and only lighted for the night. A good indication that the birds are ready to dispense with heat altogether is when you find them at night sleeping away from the hover. The cooling off must be done gradually, however, and if the lamp is not used, it is unwise to remove it from the brooder. Left in position, the chicks from habit will lie around as they did when it was alight. If taken away they will crowd into the corners of the brooder and some will get crushed.

If the birds are going to be reared on range—and it is the general opinion that certainly at some time during the rearing period the birds should be out on the ground—then the Sussex Night Ark is one of the best carry on houses for the purpose. These arks are about 6 ft. long and 3 ft. deep, fitted with a slatted floor with boards underneath to collect the manure. About forty chicks can be comfortably accommodated in an ark of this size from the age of 8 to 16 weeks, after which the number should be reduced. If it is intended to wire in an area for the ark, then one about 90 square feet is a useful range. A good many farmers do not wire in the arks at all, saying that if they are placed in a field a fair distance apart, and if water and food hoppers are kept close to the ark, there is not much risk of the chickens all crowding into one of two arks. If this should occur when the chicks are first put out, steps must be taken at once to sort them out, as trouble will ensue if they are left overcrowded even for one night so that they get into a sweated condition.⁴ If the chicks are comfortably housed in arks, and if they have a proper ridge and eave ventilation, then trouble from colds even in the most severe weather is not likely to occur. The Sussex Night Ark (see illustrations) has an opening in the front, which can be closed either with a wooden or wire slide. It also has a slide door in the roof. This is very necessary when one is wanting to catch and remove a bird. On some general farms the ark is not fitted

with a dropping board, the droppings being allowed to go through the slatted floor and on to the ground. In very cold weather it is sometimes advisable to spread sacks over the slatted floor of the arks when the chicks are first put into them. It is also advisable to put a temporary surround of wire netting round the arks for a couple of days until the birds are used to their new surroundings.

In dealing with laying hens we have already seen how a fold can be employed with advantage under certain circumstances. It is also possible to use the fold for *rearing*. A drawback is the restricted opportunity for ranging. It must be said, however, that some very good birds are reared in these folds.

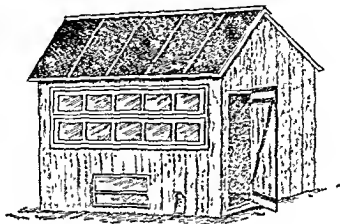
There is an all-purpose type of house which is very useful where economy is essential. Chicks can be reared there from day old and eventually perches can be put into the house for the use of the birds as laying stock, or it can be further used as a breeding pen. This house can be moved frequently with little trouble (see illustration).

The rearing ground should if possible be provided with some kind of protection from the sun and from inclement weather, for the chickens can suffer from either. In the absence of trees, hedge or wall, protection from the sun may be difficult and the birds will have to shelter in the house, but wind-breaks made of wattled hurdles covered with sacking or straw, fixed up at each end of the ark or house will take the sting out of the wind. Two parallel hurdles with a third over the top will give some shelter from the sun also.

THE REARING GROUND.

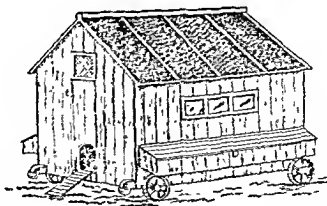
Where birds are out on range at an appreciable distance from the central buildings of the holding, dry-mash feeding will be a saving of much labour. Dry-mash hoppers of a useful type can be fixed at each end of, or behind, the night ark. The top of the hopper is carried forward to fit against the side of the ark, affording cover for the chicks in wet

ALL PURPOSE HOUSE



F.F.

FIELD HOUSE



F.F.

Fig. 19.—Above.—Useful if Capital is limited.
Below.—A good house for the stubble.

weather and keeping the mash dry. These boppers have, in front of the food trough, a shallow trough, which collects any food thrown out by the birds and so saves waste. Care must be taken to see that the hoppers are closed at night or heavy toll of the food will be taken by rats or wild birds. Galvanized hoppers are better than wooden ones, from this point of view, if they can be obtained.

Beyond ordinary routine work, it should not be necessary to interfere with the growing stock during rearing, unless one has pure heavy breeds. In that case

THE GROWING
STOCK.

the separation of the sexes will be necessary as soon as it is possible. If light breeds are kept this will have been done before the chicks went to the arks, but it cannot be done with complete accuracy in the case of heavy breeds so early as that. To leave the sexes mixed leads to bullying by the cockerels. In the light breeds the cockerels will start to develop combs and wattles very soon. The heavy breed cockerels feather up more slowly than the pullets, having bare patches on the back at times. The pullets get their tails quicker, and their legs are usually finer than those of the cockerels. The latter do not redden up until later. The best guide is the feathering, and it is safer to wait until the feathers have grown. Then examine the birds carefully, look at the hackle feathers and the saddle. Do not be misled by the baby feathers. It is new ones which are coming that are required for identification. The feathers that are long and pointed denote a cockerel, whilst rounded, or oval shaped feathers denote a pullet.

After the separation of the sexes it is well to go over the pullets and remove the unthrifty ones, i.e. those not doing well. *These passengers are best dis-*

PASSENGERS.

posed of at all stages of their growth, for unless they are going to come into lay at the proper time, they will be a liability. By far the greater part of the receipts from a poultry holding

(excluding the table plant) comes from egg production.

Whilst a grass run is excellent for the growing pullets, care must be taken to see that they do not run in long grass. When it is wet it is likely to give them colds, which might quite easily lead to worse trouble.

After chickens have been brooded in confinement, it is possible to carry them on in battery brooders, or in houses with wire floors. On this system especial care must be taken in management and feeding. The ration must be a complete one for the purpose. Where the birds are floor reared, sun parlours, or balconies fitted with wire floors are attached to the side of the house where the birds can get the

maximum of sunlight. They have the advantage over the battery reared bird, in that they get more exercise. Chicks using the sun parlours get all the sun-

INTENSIVE CHICKS.

light direct, without coming into contact with contaminated soil. With the intensive chicks, plenty of hopper space must be provided, to keep the birds busy, and help to prevent a possible outbreak of cannibalism.

Although keeping chicks on intensive lines has many advantages, especially if it is suspected that the land is contaminated in any way, it must be remembered, as stated above, that every care must be taken in management and feeding. If the poultry keeper has brooded his chicks and successfully reared them on range, he would be advised to continue on the same system if possible.

With the end of the rearing season, many appliances, from the incubator down to the small rearing houses—with their water fountains and feeding

THE END OF THE REARING SEASON.

troughs—will be finished with for the remainder of the year. Everything should be carefully looked over, and thoroughly cleaned and disinfected. Any repairs required to be done, or any renewals that are necessary, should receive attention at once. This will not only prolong the

life of the appliances, but a lot of trouble will be saved later on. Small things should be stored where they can be readily got at. If left lying about they soon deteriorate or probably get lost.

CHAPTER VII

THE LAYING BIRD

Housing the layer, preparing the laying quarters. Lighting for the purpose of increasing production. Finding the best layers..by means of the trap nest—and by other methods. How to cull the birds. Choosing birds for future breeding stock.

THOUGH the light breed pullets will have been hatched a month later than those of the heavy breeds, if the hatching for both types has been done at the proper time, then one should look for laying to start about October. If the birds are then six months old so much the better. It will often be found that some, especially amongst the light breeds, will begin to lay earlier than this, probably at four months old, and the heavy breeds at five months. This is not a good thing. An immature pullet may mean small eggs. There are various reasons for this precocity. It may be the pullets have been bred from a small bodied bird or early layer. Perhaps the food has been of too forcing a character, or too liberal. Measures can be taken to check this early laying. Cutting the rations short or moving the birds will put them off lay. Probably it will put them into a partial or neck moult also, which will keep them out of production for some time. The wisest plan is not to try to stop them laying at all, but to let matters take their course. However careful one has been in mating the breeders, it will generally be found that one or two precocious birds appear and they must be accepted as such. Whilst pullets are in the growing

stage, some poultrymen try to keep them back by feeding a mash liberally supplied with bran, and by changing their quarters, if there is available room, which is not often the case.

Since October is the first month in which eggs will be looked for, it is necessary that the pullets should be put into their laying quarters some six weeks before that time, in order to give them opportunity to settle down in their new surroundings.

LAYING QUARTERS.

Colony-houses are small movable buildings used entirely for roosting and laying, and into these they may now go on range or into laying batteries, or semi-intensive or intensive laying houses. The colony houses will not require much preparation, beyond being thoroughly cleaned and having hay or straw in the nest boxes. The laying battery will likewise have had a clean up before a fresh lot of birds are taken in. In addition to nesting material the semi-intensive and intensive houses will need the floor to be liberally littered with straw or peat moss litter; or even bracken may be used if it is available. Probably of these three types of litter, the straw is the best. It will last longer than bracken, and will not make the houses so dirty as peat moss. There should be a good supply of litter, say six inches deep, to enable the birds to do plenty of scratching. Where the pullets are going on to range, and are put into slatted floor houses, the need for perching does not arise, but where there are solid floors, perches will be necessary. In some cases provision is made to teach the birds to perch in their rearing quarters. Where this is not done, they will have to learn in the laying house. It is a mistake to let them perch too early, or on too narrow a perch, as it often leads to crooked breast bones. In most cases in the large houses perches run along the house parallel with the back wall. In others they are placed at right angles to the back. The houses will also have one or two partitions reaching from the back wall to

within a few feet of the front, to break up any possible draught. Before coming to the laying house the pullets should have been gradually broken off their rearing mash and put on to the laying ration. If this has not been done before, it should be immediately—but gradually—attended to when they get to the laying house. Should it be desired for any reason to change the system of feeding for the birds coming into lay, this is best done in the rearing quarters, or it may be undertaken directly they get into their laying quarters. When the birds are first taken to their laying house, it is wise temporarily to board up the nest boxes to prevent them from sleeping in them. If this is not done it will necessitate a visit to the house every night to move the birds to the perches, until they have formed correct sleeping habits. It may be found that a good few will at first take to sleeping on the floor and in the corners of the house. This must not be allowed. Unless stopped at once and the birds taught to perch properly, it will be a hard job to get them to do it at a later stage. When the pullets have got used to perching the nest boxes should be opened up and a few china eggs put into them for a time; they can be removed when the birds have come into lay. On no account should the shifting of pullets be delayed until they have started laying.

The best size for perches for the laying house is two inches by two inches and the edges should be bevelled. For turkeys the perches need to be a little larger. Where the perches run along the back wall of the house, they should be about 18 inches away from it and there should be a space of about 12 to 15 inches between the rows. It is advisable not to put the perches higher than 30 inches above the floor. Allow about seven inches perching room for each bird. As most of these houses have wooden floors it is usual to have dropping boards fixed just under the perches. It is a good thing to keep a supply of sand to sprinkle on the

PERCHES.

boards to facilitate cleaning. Cleaning the dropping boards should be done at least once a week. On some farms it is done every other day, or twice a week.

Nest boxes which are often fixed along the front of the house just below the windows should be about 15 inches square and about the same height. They should stand up above the floor, so as to allow all the space possible for scratching. These nests, like the perches, should be movable to facilitate thorough cleaning.

In addition to mash hoppers, or troughs, if wet mash is fed, hoppers will be required for grit and also for oyster shell or limestone grit. No birds should be without grit which is necessary to help in grinding the food, and layers must always have access to oyster shell or limestone grit, necessary for the formation of egg shell. It is also a good plan to hang cabbages, or other green stuff, up in the house, for intensively kept birds, especially, will be all the better for a regular supply of this kind of food.

In order to facilitate and increase the egg yield, many commercial poultry keepers light up their large laying houses during the winter months. Experience over a number of years has shown that the layers respond to artificial lighting. Since the best prices for eggs are obtained during the winter months, it is obvious that anything that will conduce to a larger egg yield at that period will make for larger profits. Where small houses are used on range, lighting cannot be so easily or satisfactorily carried out. There are various lighting methods most of which will give the results desired. One has the alternative of evening or early morning lighting as preferred, the whole idea being to shorten the long winter nights during which the birds get no food. To have second-year birds ready to lay in the Autumn, it will be found necessary to "force moult" them in late Summer. By this is meant the artificial, early production of moulting. To do this, the

ARTIFICIAL LIGHTING.

food is changed about July or August, mash feeding is stopped and only grain is given. If the birds can at the same time be moved to the house they will occupy in the following winter, so much the better. It will soon be found, after this treatment, that the egg yield will have dropped very considerably, though one or two birds will continue to produce eggs. After another week or two, the normal method of feeding can be gradually resumed and the birds should again be in trim for laying by the time October ends.

Birds intended for breeding stock should not be forced to moult. There is not the necessity for it because eggs from them for hatching may not be required until December at the earliest, and probably not till February.

Dry mash hoppers are usually made about six feet long. The hanging type is generally fastened to the partitions, and must not be put too high, which will prevent the birds feeding comfortably. A popular type is one which stands up on legs away from the walls, the birds being able to feed on both sides. A hopper six feet in length is of sufficient size to feed 25 birds.

The troughs for feeding wet mash are V-shaped, and may be six feet long, some six inches deep, and the same distance across the top. A trough of this size will give sufficient room for 20 birds to feed.

Where heavy breeds are kept, a lot of broodiness may occur at different times amongst the laying pullets. This can be a great nuisance, and if not checked can last over a long period.

BROODINESS. Not only does this mean a loss of eggs, but the broody birds will take up the nests required for the laying bird. These broodies should be removed as soon as found and put into a hanging coop kept at the laying house for the purpose. This coop has a slatted floor with a trough in front for feeding. A few days in this coop is generally sufficient to stop the broodiness, when the bird can again be returned to the laying house.

On most poultry farms, particularly on those where the numbers of birds run into hundreds and perhaps thousands, it will be found the generally accepted practice is to keep 50 per cent. first year birds or pullets, and 50 per cent. second year birds or hens. On some holdings the hens will only form 25 per cent. of the laying stock. The reason is that second year birds, taken as a whole, will not produce as many eggs as the first year pullets. Since the profit of the holding will be mainly dependant upon the egg supply, and since a poor layer will want as much feeding as a good one, it is clear that there should be no room for the former as soon as it is found. On a well run

THE EGG
SUPPLY.

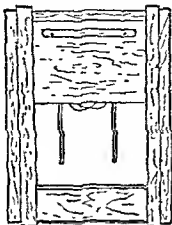
farm, the 25 or 50 per cent. of pullets retained for the second year will be not only the best layers, but in addition they must be birds of good stamina and free from any physical defects. If they should happen to be pure breeds they should conform to the standard of the breed. A proportion of these second year birds may be kept for the breeding pens, if there are breeding pens on the farm, and it is of the highest importance that all the birds retained should be of first class quality.

It is knowing what to select and what to reject amongst the layers that contributes largely to the success of an egg farm.

Whilst we shall deal here with the question of examining the birds after they have got into their laying quarters, it must be stressed that for successful poultry farming, selection and rejection will be taking place from the time the day old chick is put into the brooder house—or even before that, because even the type of egg that was incubated was the subject of careful scrutiny.

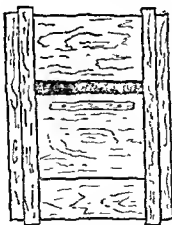
This business of looking for and removing the unprofitable bird, is known to the poultry farmer as "culling." That it pays to cull is obvious, for it must be remembered that the elimination of poor layers means a reduction in the food

TRAP NEST (OPEN)



R.F.

TRAP NEST (SHUT)



R.F.

Fig. 20.—Necessary if egg records are kept.

bill. It is advantageous to the attendant because he will have fewer birds to handle when he comes to select his breeding stock, and those he actually has to examine will be of the best.

Culling can of course go on right through the laying season, but at least once a year, the whole flock must be examined, and that does not mean a cursory examination but handling each

CULLING. bird. If only one culling can be done perhaps the best month for this will be September. By then the birds will have been in lay since the previous Autumn (i.e. October—December). Those that are still in production will probably be the best layers, as it is known that poor producing birds will moult early. If culling can be done earlier as well, say in January and in April, all the better. The final examination will take place when the houses are required for cleaning up, in preparation for the new pullets coming into lay, and when the older stock has to be moved round. When culling is successfully carried out the egg yield should not suffer.

For birds to be a paying proposition an endeavour should be made to reach a flock average of 175–180 eggs per bird per year. The higher the average is above this figure the better will the plant pay.

A PAYING PROPOSITION. The best way to ascertain the egg yield is by way of the trap nest. This is an ordinary nest with a trap door which lets down over the front as soon as the bird enters. It cannot get out until an attendant comes to release it. Then the leg band number of the bird is taken and the egg recorded on a chart kept in the laying house. Many large farmers, and particularly those engaged in the hatching-egg and day-old chick trade, practise trap nesting in this way all the year round. It can be readily understood that where a large number of birds is to be trapnested it is almost one person's work to attend to this particular task. It is inadvisable to keep birds too

long in the nests, and so many visits to the laying house are required during the day. Then there are the egg records to be made up at some time. Pedigree breeders selling hatching-eggs have in most cases to supply egg records. The enhanced price they get for their eggs and stock is the justification for trapping all through the year. The man in a small way of business cannot always find the time and labour to do this. By way of compromise, he will, instead, trap nest during the four months commencing in October or November, accepting the generally established theory that a bird which has laid during the winter will certainly do so during the Spring and Summer months. Some farmers who cannot trap nest at all, will ring, say with a blue ring, all birds found on the nest in November, in January they will use a white ring for the birds that lay that month. Similarly a red ring will mark all layers for the month of March. They will assume from this that the birds carrying the three rings are their winter—and therefore their best—layers. Whilst these methods of ascertaining the layers are a help in that the number of eggs laid can be in the one case accurately determined and with the other methods, satisfactorily estimated, they are only pointers because they merely indicate those birds from which second year layers, or breeders, are to be selected by handling. An undersized bird, one that does not conform to the breed standards, may turn out to be a good layer. On the other hand a bird may have given poor results simply through some mistake in management, perhaps from late hatching, or through an error in feeding, and it may seem to be an excellent bird when handled. Where no trap nesting or ringing has been done, a guide to present or past laying can only be ascertained by handling and inspection. There are now fairly well accepted rules which will help in the matter, any one of which will point the way, but all of which must be taken together before a definite conclusion is reached. We

RINGING.

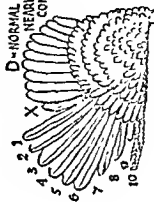
YELLOW
PIGMENT.

are very much helped in the matter by birds of the pigmented breeds, i.e. those that carry the yellow pigment (xanthophyll) in the skin, legs and beak.

In this class are the Leghorns, Wyandottes, Rhode Island Reds and others. At the beginning of the laying period this yellow pigment will be plainly seen in the beak and legs. It will also be found in the vent. When laying commences, the pigment, which is obtained from such food as yellow maize and green plants, and has been stored in the body previously, will now be required for the yolks of the eggs. As laying becomes more frequent the pigment is drawn on to a greater extent, and it will be noticed that the yellow colour begins to fade or bleach out from the various organs in a definite order. The vent will first lose its colour followed by the eye ring, the ear lobe, the beak (starting from the base) and finally the legs. When laying ceases the yellow pigment returns to the body in exactly the same order. Absence of colour in yellow fleshed breeds will denote previous egg production. From work done in the past, it is now possible to gauge the approximate time it will take for various parts of the body to bleach out, and to determine from this whether the bird is laying and how long she has been in production. The vent will become completely bleached in about a fortnight after laying is in full swing. Six or seven weeks will find the colour eliminated from the beak, but the shanks will not be entirely bleached until after about five months continuous laying. It must be remembered in this connection that certain factors will affect the degree of pigmentation. Among these are feeding and management. A bird receiving a liberal allowance of maize, and with access to a nice grass run, will be richer in yellow pigment than one kept intensively, or receiving a mash devoid of maize. This must be taken into account and allowance made accordingly, when culling is in progress. There are other points all of which will have to be carefully

JUDGING THE MOULT FROM THE PRIMARY FEATHERS

C = A SLOW MOULTER

D = NORMAL MOULT
NEARLY
COMPLETED

X = AXIAL FEATHER

REF.

Fig. 21.—A useful guide in finding the layer.

taken into account where the trap nest has not been used and the birds are of the white flesh variety.

Briefly the points for examination are :—the moult, distance between the two pelvic bones, distance between the breast bone and the pelvic bones, length of breast bone, depth, width and size of body, condition of vent, comb and wattles, condition of abdomen and head, fineness of bone, condition of pelvic bones and texture of skin.

In white fleshed breeds, past production can be judged mainly by the moult. It is generally accepted that birds

THE MOULT. producing the most eggs are the late moulters, that is birds which have laid all the previous Winter, through the

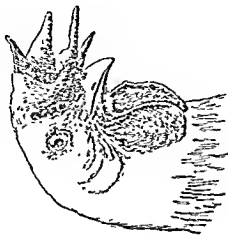
Spring and Summer and do not begin to shed their feathers until the Autumn. Birds moulting early in the Summer should be eliminated from the flock. It takes about six weeks for a feather to grow out in either a good, or bad, producer, but the good bird will grow more feathers at a time, thus completing the moult quicker. When the bird is moulting the feathers are usually shed from the head and neck first, then the breast, body and wings, and from the tail last. The new feathers will begin to come as soon as the old ones are dropped. Care should be taken in the feeding during the moult. A bird must be kept in good health and in good body weight while the feathers are growing.

Sometimes birds hatched early in the season will, after a short term of laying, have a partial moult, in the Autumn of the year in which they were hatched. Production will generally stop when this occurs. This is especially annoying as it is the period when in normal times eggs are making their top prices. The best way to counteract this trouble is to avoid early hatching if possible.

If layers are being selected in August or September the condition of the plumage should be noted for the good layer. The feathering will usually have

THE PLUMAGE. a dilapidated appearance from many

THE GOOD LAYER



FE

THE POOR LAYER

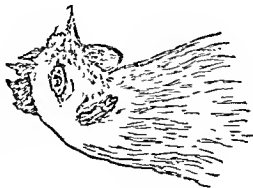


Fig. 22.

visits to the nest. The early moulters will on the other hand show signs of new and fresh looking feathers. New quill feathers are large and sappy in appearance, the old ones are hard and hollow.

It is possible to estimate when the moult began by counting the primary feathers in the wing. The primary feathers are those on the outer end of the wing, those known as the "secondaries" are on the inner part of the wing and running up to the body. They are divided from the primaries by what is known as the axial feather which is much shorter. The average bird has about ten primaries and fourteen secondaries. When a hen ceases laying in the summer, she will usually shed the primary feather lying next to the axial feather. If she is an early moult she will probably drop the second primary feather two weeks after the first, and will drop the rest of them, one by one, at intervals of two weeks. The primaries always drop in numerical order. The high producing, or late moulting hen, will moult on the same lines as the late producing bird, the main difference being the rapidity of the moult. Instead of renewing her primary feathers one after the other, several of the same length may be growing at once. So that in attempting to calculate the length of time since moulting began, these new primaries of the same length must be taken as one.

In estimating the time since the moult began, allow six weeks for the first complete new primary, and two weeks for each additional complete primary. A wing having three new full grown primaries will show the bird has been moulting for ten weeks. If none of the primaries are fully grown the estimate must be made allowing for this, on the basis that two thirds of the growth is made during the first three weeks, and the other third during the remaining three weeks. So that a half grown primary would show about two weeks growth (see illustrations).

To find out whether a hen is in lay or not, and if in lay,

the extent to which she is producing, the abdominal capacity must be ascertained. The abdomen is

ABDOMINAL CAPACITY.

the rear section of the body and contains most of the digestive and all of the reproductive organs. The abdominal capacity is taken between the pelvic bones (the two small bones at the side of the vent) and the end of the breast bone or sternum. To measure this capacity, see how many fingers can be placed between the pelvic bones and the end of the breast bone. If you have to use four or five fingers the bird is producing rapidly, or in other words is a high producer. If on the other hand the distance can only be measured with say two fingers, then the bird is not in profitable production. The measurements are of course only a guide to whether the bird is in lay at that particular time, and to what extent. It is no guide to past production. The distance between the pelvic bones themselves are a guide to laying. If say three fingers can be placed between them, then the bird is probably laying well, whereas if only say one finger can be used in measuring, the bird is not laying at all, or is producing very few eggs. A short breast bone is not considered a sign of a good layer, and if

A GOOD LAYER. one considers a little, the reason for preferring a long breast bone is fairly

obvious. As a bird comes into lay, the abdomen expands because of the enlargement of the oviduct and the intestines, and a long breast bone is better able to carry what is rather a heavy weight. The length of the breast bone is not a sign of the laying capacity of a bird. Naturally, in choosing birds to be kept on for a second year, or as potential breeders, note will be taken of the size of the bird, the depth of the body from the back to the front end of the keel bone, and the width across the back. The condition of the vent is a good indication of egg production. The moist large vent of the layer should be compared with the small dry vent of the non-layer. The comb and wattles should be noted.

Their colour and size are evidence of the activities of the ovaries. When in lay, the bird will have a red comb and wattles but, the non-producer can be known by its small, shrunk and pale comb and wattles. The abdomen of the layer is silky and pliable, covered with a thin soft skin. In the non-layer the abdomen tends to be hard with the skin coarse and thick. The good layer will have a keen sharp eye as compared with the listless appearance of the non-doer. Prolonged production will cause the pelvic bones to become thin and pliable. In non-layers these bones will be found thick and covered with fat. The skin of the good-doer will be soft, thin and silky, whereas the skin of the poor bird will be thick and dry.

If attention is paid to all these points, and birds are carefully handled and examined several times during their laying period, and known non-doers are eliminated, there should not be much difficulty in making a final selection at the end of the season. A farmer will

DISCARDING BIRDS.

naturally know and take into account when discarding birds, the whole of their life history, where there has been any error in management, or feeding, and the date the birds were hatched. Any one of these points may be the cause of non-production.

In the method adopted for culling, care must be taken in handling the birds. Fowls are very nervous, and any rough treatment may result in a drop in the egg yield. Some people cull at night,

HANDLING.

taking the birds from the perches for the purpose. Probably a far more efficient job is made of it in the day, when everything can be seen clearly. The best method in the latter case is to use a catching crate. This may be some 5 ft. long by 2 ft. wide and 2 ft. high, and will want both a trap door in the top and a movable end. The crate is placed outside the exit, about 24 birds are driven into it, and the end closed. The birds are ready for inspection.

Instead of the catching crate a wire-netting surround may be used inside the house, one edge of the netting being fastened to the wall near one of the corners of the house. After some birds have been driven into the corner where the netting is attached, the other end can be fastened so as to enclose the birds. The culler, inside the wire pen, can now select his birds.

CHAPTER VIII

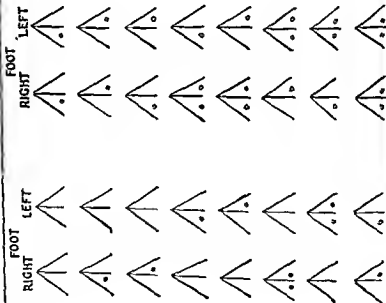
TABLE POULTRY

What is a Table Bird ? The best Table Breeds. The importance of calaur. The trough-fed bird. Cramming or forced feeding. Killing and plucking. Coaling and packing for market. The Capon.

To the uninitiated, Table Poultry may simply mean birds that have ceased to provide eggs for the table, and are only fit to be eaten themselves. Birds in this category certainly do find their way to the table—and rightly so ! If they are partly boiled before roasting, they make a nice meal. Where they have been indifferently cooked they are far from tender, as many who frequent some restaurants—not the best—will know.

To the trade, a real table bird is one that comes from a breed well-known for its good qualities, i.e. one that carries the maximum of breast meat. After being reared and brought along to about 16 weeks it has then been subjected to a term of fattening for two or three weeks before being killed and marketed. Up to about 25 years ago this fattening business was in the hands of a comparatively small body of men located in the Heathfield district of Sussex, and it was a trade usually handed down from father to son. The finishing process was a skilled job. These men rarely reared their own stock, but went round to small holders and cottagers to select likely birds for the work. Where they did not go themselves they employed "higglers" to do the buying for them.

TOE PUNCH AND CHART



EE.

Fig. 23.—Method used for identifying the progeny of particular matings.

The type of bird these men marketed was known as the "Surrey" to the trade, not because it had any connection with that county but because it was the name for the finest type and best-finished bird placed on the market. It had always been fattened usually first by trough-feeding for a term, and then finished off by a further term of forced-feeding or cramming. These old professionals knew exactly when the bird was "ripe" for killing, and when any further feeding would result not in gain but in loss of weight and condition.

When poultry farms began to increase to such large numbers after the Great War of 1914-1918, many people took up the production of table-birds alone, leaving egg farming to others. They differed from the Heathfield fatterer in that they reared as well as fattened their birds. This branch of the industry had a lot to commend it. One important factor was the quick turnover of capital. The birds were on the holding no more than 16 or 18 weeks before being marketed. The housing was not such a big and expensive item as that required on an egg farm, nor was such a large area of ground necessary.

Before engaging in this branch of poultry farming it is well to know exactly what the market requires. Opinions differ as to whether such and such a bird is the best for the table, but the producer will be wise to abide by the maxim "the customer is always right" and to see to it that he gets what he wants. Now it is maintained by those who should know that a white fleshed bird is the one most in demand, and that this is the bird that makes the best prices in this country. Here is one of the many points in which we differ from our American cousins who have a preference for yellow flesh. Why there is this preference cannot be said. Perhaps the white bird looks better. Certainly when it has

been roasted and placed on the table, the man about to dine will probably not hother whether the flesh is white or yellow. Many people say they prefer the flavour of a yellow-fleshed bird. Be that as it may, the producer will keep in his mind that his white fleshed bird is going to make a penny or twopence more per pound than the other one, and if he thinks in terms of thousands of potential table birds, and of his balance sheet at the end of the year, he will act accordingly.

This preference for a particular colour limits the choice when looking for the best breeds for the table and the prospective table poultry farmer will do well to study the different breeds and cross-breeds, both in the pen, and if possible at the Shows, before making his decision. If breeding stock is going to be kept it is of importance, in making a choice of breed, to find one that will produce a satisfactory number of hatchable eggs, and it is in this respect that the Light Sussex breed fills the bill. The progeny of the Rhode Island Red (male) crossed with Light Sussex is in much favour at the present time both for eggs and the table. Assuming this cross is taken up extensively by the breeders and hatcheries, it should be possible for the table poultry farmer to get a regular supply of day-old cockerels of a very satisfactory kind for his work, for the greater part of the year, and it should not be difficult for him to arrange for a supply for the rest of the time, even if he has to pay a bit extra and take pullet chicks as well, for that interval.

In pre-war days the peak prices for table birds coincided with what is termed the "London Season," a period which extended from the end of January until the end of July. It also happens to be the "close" season for game. Never

SUPPLY AND DEMAND.

was there a glut of properly fattened birds during that time. The demand always exceeded the supply; indeed the supply of table birds for many years did not exceed one bird per head of the population per annum.

In August and September, the holiday months, there was a fair demand in the holiday resorts, but not in the large cities. In addition there came the seasonal demand at Christmas.

The rise and fall of the market, following practically the same curve each year, gave the producer an opportunity of planning accordingly. The aim was to put the first birds on the market in February, and since these would be about 16 to 18 weeks old, hatching and rearing had to start in the fall of the year.

It might be asked "Did not these 'fall' chickens, coming at the wrong end of the year, suffer in quality"?

PLANNED
ROUTINE.

Practice has not found this to be the case. Working operations on a well run plant will be found to fit in nicely with a planned routine. Incubation,

or the purchase of day olds will be necessary each week, limiting the number obtained each time to the equipment available for use at that particular date. Take for instance brooders that will accommodate about 70-100 day olds from hatching to 4 weeks old; other carry-on equipment will be then necessary from 4-8 weeks (the end of the brooder stage) with accommodation for rearing and fattening afterwards. Supposing for example that it were desired to market 80 birds per week, then one should purchase, or hatch, say 100 day old chicks per week. This would take one brooder which would be occupied for four weeks, and since chicks would be coming in weekly, 4 brooders would have been used up before it were possible to start on number one again. It would be necessary to have a fifth brooder if proper allowance were made for cleaning up, and for not running things too closely. The other equipment required may be worked out in a similar way. A point to remember in connection with the autumn chick, if one is using incubation, is the number of eggs likely to be obtained at that time of the year. It is not the flush time of Spring

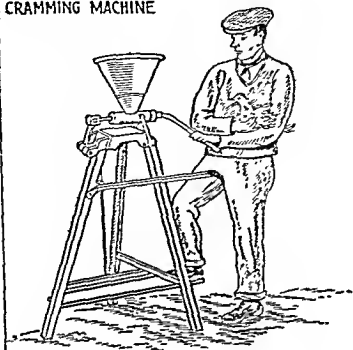
when practically any kind of bird will lay. The older birds that have laid through the Spring and Summer will probably be moulting or resting and it will be found that a larger number of breeding birds will be required in the Autumn than in the Spring. A good many producers get over this difficulty by breeding from pullets that are just coming into lay, and provided the incubated egg is carefully chosen for size, it will not be found a detriment to use these pullets' eggs. It is not as if the chicks to be hatched from them were to be reared to become potential breeders. They would be marketed for table in the usual course.

The brooding and rearing of table chickens will follow the same lines as those employed in other branches of the industry. The equipment required will be similar to that described for other young stock. Feeding will also follow the same lines. There is still a prejudice in some quarters against dry mash feeding in the rearing of table birds. It is protested that dry mash feeding results in a small crop which will not respond to good work when fattening takes place. Experimental work has not found that objection to be justified and birds reared on this system of feeding have fattened quite as well as those reared on wet mash.

It is in the final stages of producing the finished table bird that the table poultry farmer must have resource to special feeding. This part of the work will not be satisfactorily done if dry mash feeding is relied on for fattening, neither will any amount of good wet mash avail if the bird is allowed an extensive range. True, you will get quite a good table bird if you leave it in its rearing quarters, restrict its run, and feed a good wet mash two or three times a day. It is even possible to kill a bird straight from rearing, without any fattening at all, say at about 16 weeks or over, and produce a presentable carcass. These are not "Sur-

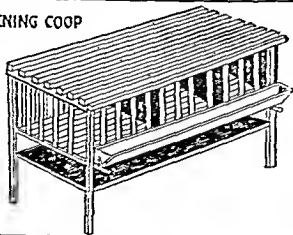
reys " however. For this trade, the birds should be picked up and put into cages or crates for soft feeding. Soft feeding will then be carried on over as long a term as the birds will readily consume all that is put in front of them, say in about half an hour. Generally two meals a day are sufficient, morning and evening, though some fatteners give an additional light meal at mid-day. Never leave food about so that it is in front of the birds all day. If they clear up the meal quickly, give a little more next time, if they leave part of their food, then reduce the next meal accordingly. It may be found, when birds have been reared on dry mash, that they will not readily take to this sloppy wet mash mixture. This difficulty can easily be overcome by starving the birds for 24 hours when they first come into the cages. Various mixtures may satisfactorily be used in fattening. In the past the mainstay of the fatterer has been a mixture of Sussex Ground Oats and Milk, and it is still considered the best food for the purpose by many engaged in the business. The exact proportions to be used, and other mixtures, are indicated in the chapter on feeding. The preparation of the food must be carefully done. It is usual to use tubs for the purpose. The water and milk are first mixed until all lumps are broken up. Then the S.G.O. are gradually worked in, and stirring is carried on during the process, with a long wooden mixer specially made for the purpose, until the mash has reached the consistency of thick cream. The food should be prepared the day before it is required for use, to allow it to ferment during the night. This stage of the fattening is known as trough feeding, and if it is desired to market the birds after this period is complete, it is usual to leave them feeding for as long a period of days as they will do so readily. As soon as their interest in the meal begins to flag it is best to kill and market the birds at once. No hard and fast rule can be laid down as to the exact number of days this will take. Where, however, forced feeding or " cramming " as it is known, is to follow

CRAMMING MACHINE



FE

FATTENING COOP



FE

Fig. 24.—Above.—Cramming is profitable in experienced hands.
Below.—Coop fattening gives good results.

the trough feeding, then the fatterer will usually take the birds off the trough at ten days or a fortnight. Rarely are birds crammed for longer periods than a week, and where a fatterer knows his work that time should suffice. The mixture used for cramming is the same as that for trough feeding, except that at this stage of the fattening, mutton fat—rendered down—is added. Cram-

CRAMMING.

ming, as its name implies, is forced feeding, and it is usually done in this country by means of a machine (see illustration). It is in cramming that the skill and experience of the fatterer tells. He takes the bird under his arm, and with one hand opens the mouth and inserts a long rubber tube into it. The tube is connected with a container on the machine, into which the food has already been poured. This food is next forced from the container into the rubber tube and into the bird's crop by means of a treadle worked by the fatterer's foot. With his free hand on the crop of the bird the fatterer has all this time been judging when it has had sufficient, or all that it is desirable it should have, and with his experience he will usually know this to a nicety. Cramming takes place twice a day. It has been suggested at various times that cramming is cruel, that it causes unnecessary suffering to the birds and that it is prohibited in some countries, and should be in this. The writer can say that in his experience over the course of many years—during which he has had thousands of crammed chickens pass through his hands—he has not seen any evidence of cruelty. Only on one or two occasions has he known of the death of a bird as the result of cramming. Of course it is not work that should be engaged in by an amateur. It should be left to the experienced hand. "Does cramming pay?" it may be asked, and the answer is undoubtedly "Yes," in the hands of the right person." A good crammer can add as much as 16 ounces to the weight of the bird in a week's forced feeding, to say nothing of the improvement in

texture which fattening brings, an improvement which makes for an enhanced price per pound in the market.

A word must be added about the crates used for fattening (see illustration). These are usually made of wood, open fronted with bars down the front so that the birds can get access to the troughs hung in front of the crates. The crates have slatted floors through which the droppings pass on to a board and these facilitate cleaning. The coops are

generally divided into three compartments, each usually taking five birds, or fifteen in the whole coop. Some

COOPS, OR
CRATES.

fatteners prefer to have these coops, or crates (which may be single or two tiered) in the open in the shelter of a wall; but in any exposed situation it is best to have them under cover; a shed provided with plenty of shutters which can be opened during the feeding and closed afterwards is often used for the purpose. Some authorities consider better results are obtained if the birds are kept between meals in semi-darkness and quiet.

Where birds have been fattened in their rearing quarters out on range it will be found more satisfactory to make the mash up into a crumbly condition instead of to the consistency advised for crate-fed birds. It is easier then to remove any food left over from the meals.

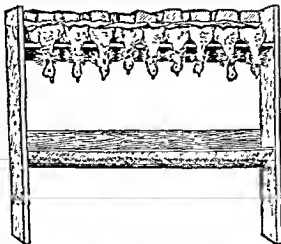
We have recommended here that birds should be marketed at 16-18 weeks of age. This course is suggested in order to meet a fairly regular demand throughout the year for a four-pound dead-weight carcase. At Christmas a larger bird is in demand, and in the past a small bird known to the trade as a *petit poussin*, which weighed about one pound to one and a half pounds and was about 10 weeks old, made a ready market in the spring months. Whether it paid to kill them off at that early age rather than carry them on, is a moot point, but it proved a very useful trade to anyone having to get rid of surplus cockerels in order to make room for growing pullets.

When fattened birds are ready for market, the first and important thing is to starve them for 24 hours in order to get the crop, and if possible the intestines, empty before killing. Birds go to the wholesale markets rough plucked, that is minus their feathers and stubs. The birds are only dressed (i.e. the offal removed) for retail customers. Consequently, unless the birds are empty, they are likely to get discoloured, or go green as it is called, during transit to the markets, and if had are likely to be condemned, with a loss to the producer. Particularly is this the case during the hot summer months.

Killing can be done by sticking, as is practised in countries where birds have to go into cold storage for export. This method is used so as to drain all the blood from the carcase. If this is not

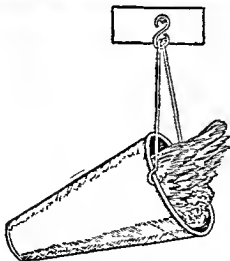
KILLING. done the flesh is apt to be discoloured when the carcase is required for the table. A long knife is used. It is inserted in the mouth, the roof of the mouth pierced and the jugular vein cut, practically in one operation. "Is this a cruel method," ? it may be asked. It would be, if practised by an inexperienced person, but in the hands of the professional it is almost instantaneous and there cannot be any suffering. The writer has seen this done on many establishments both in this country and abroad, and at no time has he seen the operation done otherwise than in a proper humane manner. In this country birds are quite commonly eaten the day after they arrive in the market, and so killing by dislocation of the neck is the usual practice. To kill a bird by this method take the legs, wings and tail in the left hand, grasp the back of the neck with the right hand as near to the head as possible. The head should then be through first and second finger and resting on the palm of the hand. A steady pull downwards with a slight turn of the head upwards will then dislocate the neck, leaving a small cavity near the head into which the blood will drain. It is necessary to keep the bird's head downwards until the

WOODEN POULTRY PRESS



FEF.

METAL CONE FOR WEIGHING LIVE BIRDS



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Fig. 25.—Above.—Presses are necessary for shaping the carcase.
Below.—This saves a lot of time when weighing.

blood has drained away. This method can be done easily and quite quickly after a very little practice and there is no cruelty attached to it. Care must be taken, however, to see that the neck is properly dislocated. The writer has on more than one occasion seen birds offered for sale that had merely been strangled, a practice for which there cannot be the slightest excuse.

Plucking takes place immediately the bird is killed, and an easier job will be made of it, and a cleaner one, if it is performed whilst the carcase is still warm.

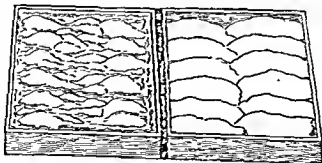
PLUCKING. This work can be done by machine or where the output does not warrant the use of the machine, by hand. A method used just before the war on some farms was wax plucking. The bird was dipped for a second or two into melted wax. It was then hung up until the wax was properly cooled. The wax could then be peeled off the carcase, taking the feathers with it and making a satisfactory job of the work. At the time this method was introduced it did not seem possible to reclaim either the wax or the feathers, making it rather an expensive process; but probably this will be remedied in time. Some fatteners before hand-plucking dip the carcase for a minute into boiling water. This facilitates the removal of the feathers, but it is said to take the bloom from the bird also. A good fatterer will hand pluck as many as 15 to 20 birds per hour according to size. It is of course work that calls for experience. Quickness in plucking without tearing the carcase comes readily to the young beginner after a little experience. An old fatterer known to the writer always ruffles the feathers before beginning operations. Then grasping the legs and wing feathers in one hand and keeping the skin tight, proceeds to strip the feathers up each side of the breast to the neck. The breast itself is then dealt with, afterwards the legs, the tail, and finally the back and wings. The removal of the stubs, undeveloped or pin feathers, is often left to casual labour on a large plant. Women usually

SUSSEX MARKETING PEDS



P.F.

NON-RETURNABLE PACKS



P.F.

Fig. 26.

do the work at a penny or three-halfpence a bird. It does not call for experience, but rather for patience. A blunt knife is usually used for removing the stubs. It is essential that all this work be done as early in the day as possible, so as to allow plenty of time for the birds to cool off before being packed for market. They require at least three hours to be cooled. Cooling and pressing into shape takes place at one and the same time. Many presses are made of wood. They consist of two shelves joined together to form an angle a little less than a right angle. As a rule these are built up in tiers. Into the troughs thus formed the birds are pressed breast down, with the head of the bird hanging down in front of the trough. The carcase must be pressed well in against the back board. A board is then placed over the backs of the birds, with some heavy weights (usually bricks) on top. Metal coolers are now on the market and these are a great improvement because they are jacketed to allow water to flow through them, to make a better job of the cooling. In thundery weather it is customary in some fattening establishments to "rope" the chickens. This trade term means to remove the intestines, and it is done to make doubly sure the carcase will not go green during transit. The intestines can be removed through the vent with the little finger or a button hook. Care should be taken not to break them during removal. This removal will mean a little loss in weight, but it pays in the long run. Some distributors will allow for weight when roping is done.

After the cooling comes the packing for market. There are two methods, the old one, and still in much use in this country, by means of the Sussex ped, which is a returnable crate made of wood, and the more modern way of the non-returnable package, an idea introduced from the continent. This non-returnable box is made of light wood and will contain 6 or 12 birds packed in one layer in grease

PACKING.

proof paper, as compared with the Sussex ped which will take 12, 18 or 24 birds packed in rows one above the other, breast down, with a thick layer of straw or bracken between the rows, at the bottom, and over the top row. The non-returnable package is closed with small nails, the Sussex ped with string. Birds are usually sent off by the evening train in order to arrive for the next day's early market.

It is a mistake to consider any bird will do for fattening. The experienced fatterer can only make a first class job when he is dealing with good healthy stock.

THE CAPON

No article on table poultry would be complete without mentioning the Capon. This is of course a castrated male chicken. As with other animals so treated it will differ in many ways from the cockerel. The bird properly caponised will seldom crow, the comb and wattles cease to grow. The hackle and saddle feathers grow very long, the plumage taking on a glossy appearance. That it has been a favourite dish through the centuries we know, for does not Shakespeare speak of "the justice, in fair round belly with good capon lin'd." It is said that it has a superior flavour to an

uncaponised bird. Over the ordinary
ADVANTAGES. cockerel the capon has many advantages.

It is quieter in disposition, showing no inclination to fight, does not want much exercise, and stands close confinement well. As a result of this desire to stay around and just eat he puts on flesh and grows to a greater size than a cockerel of the same age. The capon will also fatten more readily than the latter. Why then, it may be asked, are not more capons found on the market now. The answer probably is that though the capon will make a better price per pound than the cockerel, it is open to question whether it makes a higher profit. A cockerel

should be marketed by the time it is 20 weeks or five months old, in most cases it is marketed a month earlier. Kept much longer than five months it will begin to get "staggy," with a consequent drop in price. The capon on the other hand is often not at its best until about 10 months old. There is not much evidence available as to the cost of feeding a capon up to the time of marketing. If kept in large numbers, they will take up room often required for other purposes.

It will thus be seen that quite two and nearly three batches of cockerels can be produced and marketed one after the other by the time that one batch of capons is ready.

Surgical caponising is fairly simple to learn, but the surgical method has been superseded by the chemical method, which is very simple, has no risks, gives better results for the smaller birds and can be done by anyone. The effects only last from 6 to 8 weeks ; but this is long enough for present day needs; if not, a second dose can be given.

The method is to implant a small pellet of stilboestrol or one of the other "oestrogens" which can be had for the purpose, under the skin, high up in the neck.

Where birds are to be killed at 12-14 weeks of age the implantation is done at about 8 weeks of age, or roughly about 6 weeks before killing, if killed at a later age.

The chemical method has all the advantages of the surgical one with few of its disadvantages.

The feeding of mashes containing one of the several antibiotics is now common in the feeding of table birds.

It gives best results at from day old to 8 weeks ; but can be continued to 20 weeks in the case of turkey poults. It results in better growth rate and fewer culls in many cases.

It adds only a little to the cost of the food and is an advantage in most cases where table chicks are being reared.

The term "broiler" is used for a young table chicken of from 10 to 14 weeks of age and weighing from $3\frac{1}{2}$ to $4\frac{1}{2}$ lb. as a rule. Breeding has produced very much quicker growing chickens than were found before the Second World War. Live weight of a cockerel averaged about $2\frac{1}{2}$ lb. at 12 weeks old in 1932, while in 1953 this average had gone up to $4\frac{1}{2}$ lb. at the same age. It is this type of bird that is required for broiler production.

There are a number of methods of producing these broilers. Usually, cockerel chicks are bought at day old, placed in a brooder house, under one of the many types of brooders, and grown on as fast as possible. In order to prevent any check in growth which a move might cause, the chicks are often kept in the same house all the time and fed on the same type of food, either pellets or mash, with or without antibiotics. As appetites sometimes flag at about 10 weeks of age a wet mash is given, as well as the same dry mash as before. If the water used for this wet mash feed is mixed with $\frac{1}{2}$ pint of molasses to each gallon of water results are often improved.

In the feeding of broilers it is usual to give the mash or pellets *ad lib* all the time. To save labour in giving a wet mash feed, the top of the dry mash is watered with a watering can, just to make the top wet. This is done for about the last two weeks. Most baby chick mashers are suitable.

Broilers are killed off the brooder and no special fattening is done, although chemical caponisation is usual.

The birds can be produced much more cheaply by this system than by the Sussex method and very few Surrey birds are now produced.

Crosses suitable for broiler production are the R.I.R. \times Light Sussex, The New Hampshire Red \times Light Sussex and the Light Sussex \times North Holland Blue. The last giving, perhaps, the quickest growth of all.

CHAPTER IX

TURKEYS, DUCKS AND GEESE

The various breeds. General management. Hatching, Rearing, Feeding, and marketing far table. The laying duck. The Guinea Fowl.

TURKEYS

UNLIKE other classes of poultry, with the possible exception of geese, turkeys are associated in the mind of the public with Christmas. There is now a growing demand for a small turkey of from 6 to 12 lb. for the housewife and for a large bird of 18 lb. and over for hotels, all the year round. Despite this, the breeding of turkeys has increased enormously in recent times (excluding the war period). Large numbers have always been imported every Christmas season. The demand is naturally for a large bird, but not so large as was customary some years ago. The bird now in favour is a poult weighting about 10 pounds with cocks scaling from 12 to 18 pounds.

IN the U.S.A. there has been considerable improvement in some of the breeds of turkey and these have been introduced into Britain and are now becoming popular because they are much nicer looking birds when killed. As these new breeds have much broader breasts than the old American Bronze they are known as "Broad Breasted." We thus have now : Broad Breasted Bronze, Broad Breasted White and a smaller turkey, which also has a broad breast, known as the Beltsville White.

The old American Bronze, sometimes called the Mammoth Bronze, is now taking second place to the Broad Breasted Bronze.

The White Turkey, now known as the "British White" has been much improved in this country and still holds its own with the newer breeds. The trend is for a white turkey and it is likely that the three white breeds, the British White and the Broad Breasted White, both large breeds and the Beltsville White, a small breed, will become the most popular.

The Norfolk Black is a favourite with some who like it as a small breed ; but it is not so popular as it was.

The advantage of the white breeds is that they can be killed at almost any age and still look well when plucked ; thus they fill the bill for the greatest demand for a small, young turkey. The bronze and black breeds do not look so well until almost fully grown.

Careful selection of the breeding stock must be made and only healthy and well matured birds selected. Most breeders prefer them to be two or three

SELECTION. years old, considering birds of this age to be the best for breeding. Others will use younger birds provided they have been hatched early and are well developed. Very large turkeys do not often make the best breeders; this especially applies in the case of the males, where heavy weights are of detriment to good mating. A young male scaling about 20 pounds is the ideal weight with the hens tipping the scales at fifteen or sixteen pounds.

One male should be mated to eight or perhaps ten females and mating should take place sometime in January.

As regards housing, a large open shed will do. Perches should be at least two feet from the ground. In an ordinary fowl house, an adult turkey should have plenty of room, about 8 square feet of floor space.

HOUSING.

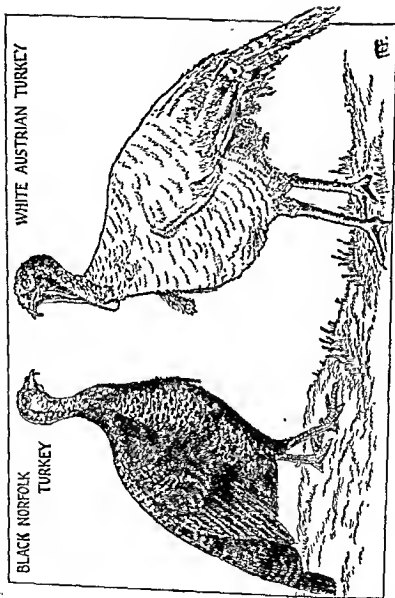


Fig. 27.—Two useful breeds.

AMERICAN BRONZE TURKEY

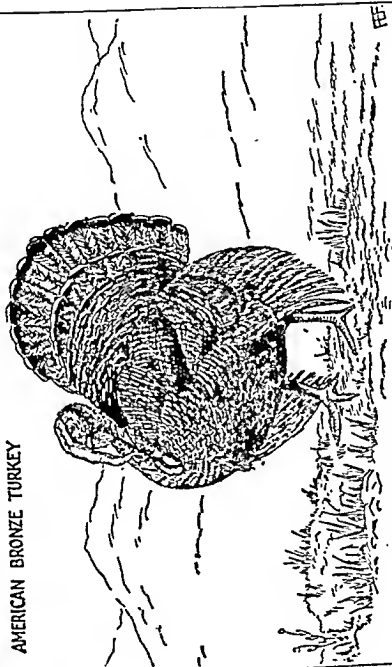


Fig. 28.—Produces large birds.

Eggs should be looked for about March, and as turkey hens lay away if favourable opportunity occurs, a watch must be kept for these nesting places. Nests should be provided to encourage the birds to lay in their home quarters.

Incubation takes 28 days, and hatching can be done either by natural or artificial methods. The turkey hen will sit on

her eggs, but it is customary with

INCUBATION. natural hatching, to use a good size

broody hen if available. When hatch-

ing in an incubator, the procedure is closely similar to that advised for hen eggs (see incubation). The temperature should be about 103 degrees F. in hot air machines, 104 deg. F. in hot water tank machines and 99½ to 100 in cabinet machines. Turning may take place three times daily. In the case of turkey eggs, some people recommend a cooling for about 10 minutes a day during the last ten days of incubation. See plenty of moisture is provided, and it is advisable to sprinkle the eggs with luke warm water each day during the last week. Test about the eighth day for infertility. This is very necessary with the early hatches, for should there be many infertile eggs it may be advisable to remove the male bird and feed him up for a day or two.

Turkey eggs do not hatch well in cabinet machines unless they have separate hatchers, because while the humidity should be kept fairly low for the incubation period, up to about the 24th day, it must then be succeeded by a high humidity up to the time of hatching.

Rearing turkeys is not the difficult task often imagined. Where there are only a few to rear, large coops with a run attached may be used, and they may then be reared naturally by the broody hen. The runs can be removed after about a fortnight, and the youngsters will do without the hen when about six weeks old. When a couple of months old they will have outgrown the coops and should be housed and

allowed to roost on boards raised about two feet from the floor. When large numbers of turkey chicks have to be reared, then the artificial method of brooding will have to be used. The ordinary brooder will do for the purpose and units of 30-40 can be run in a 100 chick brooder. Heat will be required for about six weeks, a little less when the weather gets warm. The temperature of the hover should be between 95 and 100 degrees F. during the first week, and should be gradually reduced afterwards. When intensively brooded, sun parlours similar to those used for other poultry stock are recommended to enable the turkey chicks to get the maximum amount of sun and fresh air. Where the young turkeys have access to a grass run they should be encouraged to use it as often as possible. The grass must be kept short. It should be remembered that turkey chicks need more room than ordinary chicks at all stages of their growth, and about double the floor space should be allowed for them when they are being reared intensively. There is no best system of feeding. Wet or dry mash and grain, as preferred, or even pellet feeding, can be practised.

Turkey poults are best fed on the *ad lib* system where feed is always before them. Dry mash is the more usual; but pellets are often used. Special turkey mashes and pellets are now available for the various stages in growth and it is wise to keep to these.

The great trouble with rearing turkeys, in the past, has been the danger of the disease called Blackhead, which may attack birds of almost any age up to 10 months but most troublesome from about 10 days until 6 months of age.

By keeping the growing poults on wire netting or slatted floors and not letting them onto the ground, where most of this trouble is picked up, and/or giving one of the drugs now available for the prevention of this disease, either in the food or drinking water, Blackhead can be kept at bay.

KHAKI CAMPBELL DUCK



Fig. 29.—An excellent egg breed.

DUCKS

Duck-keeping today falls into two separate categories : the birds are bred either for the table or for egg production.

BREEDING FOR LAYING. A great advance has been made in recent years in breeding for laying purposes. The keeping of ducks in

large numbers, or those of the larger varieties for breeding purposes, is not very satisfactory on small holdings because they need ample range, and this is more likely to be available to the general farmer, who can allow them to roam over low lying pastures and along the hedgerows, where they will forage and get a great deal of the food they require. A pond or stream, whilst not being absolutely necessary, is an advantage. Small holders can of course keep ducks in small numbers in confined runs, and some people do this with good results, but costs of feeding in this case will be higher than under conditions of free range. There is an objection in some quarters to what is termed the strong taste of the duck's egg. This is largely a matter of fancy now, when ducks are kept under much better conditions than they were a few years ago. Some of the more modern breeds of ducks are wonderfully good layers, producing many more eggs than laying pullets. Flock averages of over 300 eggs per duck are now obtained.

Except for very small numbers, laying ducks, of which the *Khaki Campbell* is now the only economic breed, are best kept on the Dutch system. This consists of rows of small shelters about 6 ft. long and 2 ft. wide with runs attached, the same width as the length of the house and about 20 ft. long. At the bottom of this run is a continuous drinking trough. Feeding is also done at this end. Seven to nine ducks are put in each run, which is made to slope away from the shelter for drainage. In bad weather the runs are strawed down. In some cases large houses take the place of the small shelters, these have similar runs on either side and are divided inside into spaces of about 2 ft. by 6 ft., with

ROUEN DUCK

PEKIN DUCK



Fig. 30.—Good table ducks.

a passage way down the centre. In this way many thousand ducks are sometimes kept. Breeding can also be carried out under this system with first class results.

The Aylesbury is now the only economic duck for table work. Both egg production and growth rate have been much improved by selection. 80 eggs can be had from a good duck in the breeding season and growth rates of from 7 to 9 lb. are often obtained in 9 weeks with the better strains of ducks.

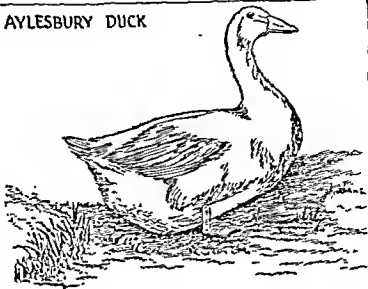
TABLE DUCKLINGS.

In mating up the breeds, the table stock should have one male to five females. With the laying stock one male bird to six females may be allowed, and even flock mating can be practised. The heavier ducks will be all the better if

MATING UP.

they have access to swimming water. The use of ducks under twelve months old for mating is not recommended. A vigorous young drake can be mated with the more mature ducks. Early mating will have to be undertaken if ducklings are required for the spring and early summer trade. The birds for mating should be selected early in the fall and mated up well before the eggs are wanted for hatching. Where eggs are required for table, then March and April are the best months for hatching. It is possible, where one does not wish to breed, to purchase day old ducklings, and they can be sexed if required. Duck eggs can be successfully incubated, but where numbers are only small, it is best to use a broody hen. Seldom are ducks used for the purpose. Nine or ten eggs are usually sufficient for one hen, though a dozen Runner eggs can be given to a large bird. The treatment of eggs during hatching under broodies is the same as in the case of hen eggs. Some breeders, feeling that duck eggs require more moisture in the air surrounding the eggs, obtain this by watering the ground around the sitting coop every day with a little warm water. During the last week or ten days, particularly if there is an

AYLESBURY DUCK



FEF

INDIAN RUNNER DUCK



Fig. 31.—Above.—The old favourite for the table.
Below.—A prolific layer.

east wind blowing, or the weather is very dry, the eggs are sprinkled with warm water just before the hen returns to the nest. If incubators are used the temperature should be one degree less than for hen eggs, viz. 103 degrees F. The eggs should be turned three times daily, and during the last week or ten days should be cooled for about ten minutes each day. A liberal allowance of water is necessary all through the incubation period, and during the last week eggs should be sprinkled with lukewarm water each day. Eggs should be tested on the eighth or tenth day for infertiles, as in the early part of the year the percentage of these may be high. A second test about the eighteenth day will enable one to remove eggs containing dead embryos.

Ducklings are hardy birds, and rearing of both table ducklings and those intended for egg production can be done either with broody hens or artificial brooders. When the ducklings are hatched, it is well to allow them to remain with the hen for about three weeks. After this time several lots can be combined in one house. After the first few days grass runs should be made available. It is useful to provide a wind break.

The ordinary hover is the best for artificial rearing. Placed in a house about 6 feet square it will take about 50 ducklings comfortably. Special care must be taken to guard against vermin as rats are very partial to ducklings.

ARTIFICIAL REARING.

The temperature for the first few days should be 95-100 degrees F., gradually reducing it each week until it is possible to dispense with it, between three and four weeks afterwards. When ducklings are being reared for the table, it is required to bring them on as early as possible, so as to be able to market them when they are about nine or ten weeks old, that is to say before they get their second coat of feathers. Therefore a big frame should be produced during the first weeks and feeding for flesh should be done in the later stages. The run of these ducklings should be curtailed

during the last week or ten days before marketing. No swimming water should be allowed.

Rearing for egg production may follow the same lines as for table during the first few weeks. After finishing with

REARING FOR EGG PRODUCTION. heat, the ducklings may be accommodated in large roomy coops, being given a large run or their liberty. At about eight weeks the sexes should be separated. They are very nervous and react to anything out of the ordinary, so they must not be treated roughly. One can distinguish the sexes by getting them together. On rounding them up it will be noticed that the ducks make the familiar quacking whereas the drakes make a decided hiss or harsh shrieking noise. Any doubtful ones can be left out of account at first and be checked afterwards. When the sexes are separated the ducks can be given their liberty. Slow growth is desired in the case of ducks for laying. A few weeks before they are due to lay they should be housed in their permanent quarters, to give them time to settle down. The drakes on separation may be treated in the same way as that employed for table ducklings, for though not a table breed, the writer can testify to the excellent eating qualities of a Khaki Campbell drake after it has been suitably fattened. The treatment of any ducklings intended for future stock will be exactly the same in the brooding and rearing period as that given to the potential layers. They must be allowed free range after about five weeks, and will be all the better for access to swimming water.

Ducklings require feeding at frequent and regular intervals in the early days after hatching. Little and often should be the rule, and for this reason they should get five meals a day of a crumbly moist mash fed in shallow troughs. The number of meals can be reduced to four after the first week, and again to three when the ducklings are past a month old.

In fattening ducklings for the market, three meals a day of a good fattening mash should be given, allowing the

FATTENING DUCKLINGS.

birds all they will eat in a reasonable time, and removing the surplus. During the latter part of fattening keep the birds littered with plenty of good clean straw in order to prevent soiling the flesh and feathers. Remember, clean white feathers, especially those of the Aylesbury, are a profitable side line.

The ducklings should be starved for quite 24 hours before killing, so as to empty the crop and intestines. Killing is

KILLING. best done by dislocation of the neck, though this is less easy than in the case of fowls. If done properly death is

instantaneous. Plucking should be done at once whilst the body is warm. Great care must be taken in the plucking since the skin and flesh of a well-fattened duck is much more tender than that of a chicken, and tears more readily. The feet should be washed if dirty, and the bird put breast downwards on a shelf or table with a weighted board placed over the back. Where a lot of birds are being handled the ordinary shaping trough described elsewhere should be used. Never pack birds until they are properly cooled off. It should be remembered with table ducklings that they should be killed for market before the second lot of feathers begins to appear. Failure to market them then will result in the ducklings losing condition, and it will take another month or six weeks to get them into condition again.

GESE

Geese are kept entirely for the production of table birds, being most in demand at Christmas with a lesser demand at

**DEMAND AT
CHRISTMAS.** Michaelmas. They cannot be kept well in confinement. Whilst commercial

poultry farmers will run a few geese to graze the grass in their chicken pens—and they make a good job of this—the place for keeping geese in any number is the general farm or a holding with

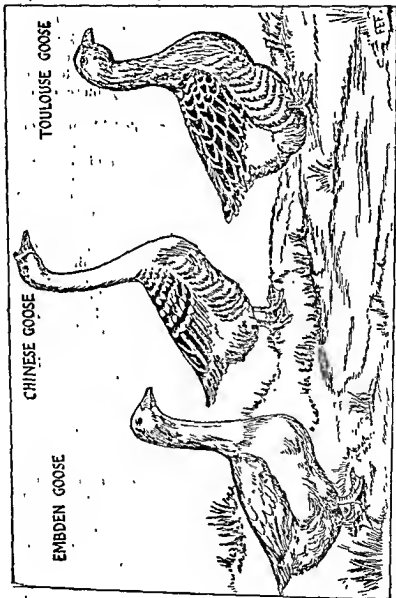


Fig. 32.—Three good types.

facilities for grazing on common ground. Here they will find a good deal of their food. It is open to question whether geese should be allowed to range over good grass fields, but they can with profit be allowed to feed on the stubble after harvest. Housing for geese need not be a difficult matter, a large open fronted shed being sufficient, each bird requiring about 8 square feet of floor space. Perches are not required, but some litter should be provided. Care must be taken of course to guard against foxes.

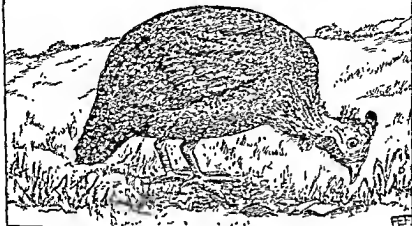
As regards the breeds, there are the Embden (a pure white breed) and a quick grower, and the much larger and slower growing Toulouse, which is grey. Then

THE BREEDS. there are the Chinese varieties, smaller birds and therefore more in demand with small households. The Chinese breed when ready for the table will scale some twelve pounds. Breeding geese should be about two years before being mated to a young gander. Half a dozen geese to the male is the usual number and they should be mated in the Autumn in order to get them settled in together before the early spring hatching. Swimming water need not be provided for the breeding geese. Hatching is better done by broody hens giving four or five eggs to one hen. If the geese which go broody at times are allowed to sit in the early season, the chances are that they will not lay another batch of eggs for some good time. Should there be a lot of goose eggs to hatch and enough broodies are not available, then resource must be had to the incubator, and in that case the same routine will be carried out as advised for hatching duck eggs.

Goslings are the easiest of all birds to rear, and the ordinary hover as advised for brooding ducks can be used.

GOSLINGS. This need not be in use for more than one to two weeks. If the goslings are being brought along by the broody hen, then they should be allowed to stay with the hen for three or four weeks. They grow very quickly and must have

GUINEA FOWL



EGG GRADERS

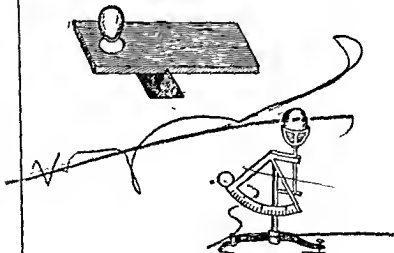


Fig. 33.

pleoty of room. Rearing can be done as recommeoded for the other water fowl. Goslings may be fed in a manoeer similar to that used for ducklings. After a time, if they cao have access to grass, two or three light feeds daily will be all that is necessary. Geese should be fatteeod for about three weeks, and if they are confined at all it should be in a roomy shed with ao open front, allowing about ten square feet per bird. The ration should be of a good substaotial nature aod may ioclude, as well as middlings, barley meal and maize meal, a good allowaoce of steamed potatoes.

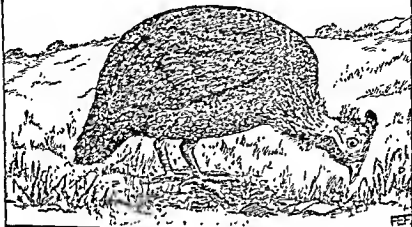
GUINEA FOWLS

A book on poultry should make some mention of Guioea Fowls, although one sees them in most places simply for ornamental purposes. In a farm yard they prove very good "watch dogs." In spring the guinea fowls will make a ready sale when the ordinary fowl is in short supply, and it is suprising that they are not seen on the market at other times of the year.

Housing is not required for them. They prefer to roost in the trees, from whence they will utter loud cries at the approach of any human being or animal.

The most common colours are speekled, and there are also whites. Both sexes ore alike in colour and the male bird mates with about three females. It is usual to leave them to make their own nests in a position they fancy, and a look out should be kept to locate these. Eggs are dark brown marked with spots of a lighter colour. They are looked on somewhat as a luxury and they make a good sale. Hatching takes 28 days, and the hatching and rearing are best left to a broody hen. After hatching, the broody should be confined to the coop for about a month, until the young chicks are well on their legs and beginning to fend for themselves. Feeding should be similar to that given to ordinary chicks, wet mash being preferable, and this should

GUINEA FOWL



EGG GRADERS

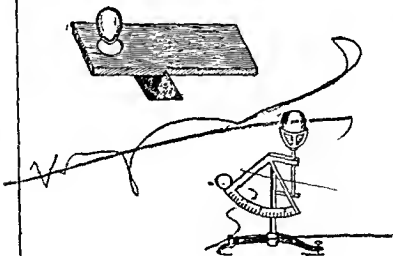


Fig. 31.

plenty of room. Rearing can be done as recommended for the other water fowl. Goslings may be fed in a manner similar to that used for ducklings. After a time, if they can have access to grass, two or three light feeds daily will be all that is necessary. Geese should be fattened for about three weeks, and if they are confined at all it should be in a roomy shed with an open front, allowing about ten square feet per bird. The ration should be of a good substantial nature and may include, as well as middlings, barley meal and maize meal, a good allowance of steamed potatoes.

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CHARACTERISTICS AND MANAGEMENT.

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be fed to them five times a day for the first week, reducing gradually to four and three meals a day. When the chicks are ready to range they should have their liberty and will require little feeding. This can be given to them when they come back to the farm yard at night. In the early stages it is necessary to keep the youngsters dry, as they react very quickly to damp conditions.

CHAPTER X

MARKETS AND MARKETING

Wholesale and Retail markets. The best methods of marketing. Packing Stations for eggs and poultry.

GOOD marketing is essential for a successful business. One must of course provide just what the public wants to purchase, but having done this, having successfully surmounted all the hazards associated with production, what a pity it is to fail at the last stage, by careless marketing ! Yet, it is at this point that we, in this country, have lagged behind the foreigner. There are now signs of much improvement in this direction. The authorities concerned, recognising the importance of proper marketing, have done much to encourage ways and means to this end. The grading of produce for size and quality is advised and practised, proper packages for different classes of goods are recommended, and market requirements for different seasons of the year are announced.

There are now a number of packing stations for table poultry. Some of these take the birds, kill, pluck, truss and market them for a small charge. Others take the birds and pay so much per pound on the live weight. Many poultry keepers now market through these stations which will take all classes of birds, special table birds, old hens, cocks, etc. Some of the egg packing stations now have a table bird section.

In the same way they could take fattened birds and simply charge for killing, plucking and marketing. Some stations would purchase the birds outright from the producer. This was a very welcome help for a producer who found it difficult to get a good fatterer, or could not find the necessary labour to kill and pluck his birds. It is possible these stations may go ahead when things settle down again, and it may become compulsory for all producers to sell through them in the interests of good marketing.

Packing stations for the reception of new laid eggs have been established. Eggs from the farms are collected by vans and brought to the packing station.

Here they are cleaned if necessary, (though this should be done by the producer himself) candled for freshness, graded for quality and size, and then packed in the proper cases for shops, hotels, etc. The packing stations pay the producer the price received for the eggs less a charge per dozen to cover the overhead expenses of the station. There is much to be said in favour of these stations, which up to 1939 were on a voluntary basis. Now all eggs have to be sent to them, with the exception of those from very small producers. Whether this compulsory measure will continue is not known, but it would be a misfortune to go back to the "anything will do" style of marketing of the past. However eggs are sold, they should be marketed fresh and clean. No eggs from "stolen" nests, i.e. eggs laid away from home in hedgerows and the like, should be packed with those of known age. There is a risk of them being bad, and a bad egg will naturally mean a dissatisfied, and probably a lost, customer. If the producer is serving his own private customers, he should grade his eggs for size in the same way as the packing station.

There are various methods of marketing table poultry. The man in a small way of business will naturally look for

MARKETING
TABLE POULTRY.

private customers to whom he will retail his birds. Where the producer has a large regular output throughout the year, the private customer is not necessarily the best proposition. However many customers the producer may have, he is bound to have some birds left on his hands at times, which he will have to sell as best he may, and he will be lucky if he is always able to place these in a shop at the price he desires. Large consignments can be, and are, marketed through the hotels and large catering establishments, but here again is the danger of supplies not being wanted at certain times. The writer, who marketed birds regularly over many years, found the large wholesale markets a very satisfactory outlet for his produce. However the quantities varied the birds were always taken without hesitation and a cheque in payment came back promptly in the course of a day or two.

Chickens should of course be graded for market, that is they should be of as near a size as possible in each package.

GRADING
CHICKENS.

Especially should this be the case in the non-returnable package, and the reason for this is obvious. If the packages can always be depended on to contain

exactly what the invoice says, and nothing else, then confidence is established between producer and distributor, and again between distributor and purchaser. As a result, a great saving in labour, time, and temper is effected. The purchaser can buy on the invoice with confidence and need only look at one sample package, or not even bother about that.

Table birds are now sold under the following grades :

| | | | |
|--------------------|-----------|---------------------|-------------------|
| Double Pousin | 13-24 oz. | Banquet Chicken | 5 lb. and over |
| Asparagus Chicken | 1½-2 lb. | Surrey (crammed) | 3½-6 lb. and over |
| Spring Chicken | 2-2½ lb. | Bouling Fowl, Small | 3-4 lb. |
| Summer Chicken | 2½-3 lb. | " Medium | 4-6 lb. |
| Harvest Chicken | 3-3½ lb. | " Large | 6 lb. |
| Michaelmas Chicken | 3½-4 lb. | Dockling | 3-4 lb. |
| Family Chicken | 4-4½ lb. | Norfolk Dockling | 4-5 lb. |
| Party Chicken | 4½-5 lb. | | |

The 3 to 4½ lb. chicken is often bulked under the term: "broiler."

The writer was once told at Smithfield, by a large distributor, that three-quarters of the produce handled by him came from abroad, and was dealt with by one-quarter of his staff, leaving the one-quarter of English produce for three-quarters of his staff to handle.

Marketing has been reduced to a fine art on the Continent where it is done under government supervision. Producers

would do well to make it their business

to visit the large wholesale markets. It is

an object lesson and it will pay them to

do so. The distributors, though busy men,

are always ready to find the time to discuss the market and

to give advice on marketing and market requirements.

If the producer arrives in the market early enough, he will

probably see, or would have seen before the war, scores of

packages stacked one on top of the other, marked with a

foreign label, and the contents described in plain terms. So

will come a buyer with a large order, look at the labels and

place his order, departing, in many instances, without having

one package opened for inspection. It will be a great day for

us when we can market in like manner. Birds that still go to

market in the Sussex ped, have all to be turned out, graded

and repacked before sale, for though one will often find a

layer of good birds on top, some slightly poorer ones will be

found in the next row, and so on, until in the bottom row are

found the third rate birds. It is probably forgotten that when

the ped is emptied these poor birds will come out on top!

The willingness to take any varying quantity of chickens

at unstated times, together with prompt payments for consignments,

makes wholesale marketing much more attractive

than the uncertainties of retail trading despite the increased

prices received from the latter.

All types of poultry farm will at some time or other have

old hens and cocks to dispose of. Birds finished with as

breeders, pullets that have ended their laying season, and

whose record does not justify their retention for another

CONTINENTAL EFFICIENCY.

year, as well as hens that have gone through two seasons and are not quite right for the breeding pens : all these will have to go. There is a good market for this

LOCAL MARKETS. class of fowl at certain times of the year, and for the same trade, the birds can be sold alive in the local markets. The birds must, however, be well fleshed. Thin and out-of-condition birds will make next to nothing. Enquiries should be made at the markets as to when the birds will be required.

Ducklings for the table must be marketed when about ten weeks old, or they will soon begin to go back. Where there are not many to dispose of, probably it is better to sell to private customers or the local poultry shops. If large numbers are to be sold, then the markets will have to be the channels of disposal.

Geese in the same way can be marketed privately if not in large numbers. Plucking geese has to be carefully done. As with ducks, it requires more care than plucking fowls, and for that reason many producers like to dispose of their birds alive if possible.

Turkeys are often bespoke by customers some time before Christmas and a good many of them can be disposed of in this way to private customers. There is usually a big demand for turkeys of all sizes right up to Christmas Eve, after which it practically ceases. Unsettled mild weather will cause prices to fluctuate rapidly as will the arrival of heavy imported consignments. Local markets will take turkeys alive, but the wholesale markets will want them killed and plucked. If large numbers are to be disposed of, they should be carefully graded when packing for market.

Poultry Manure is a marketable sideline from all types of poultry holdings. It is not out of place to mention it here.

True, it does not make the ready sale it should, probably because little has been heard of it. As a fertilizer it should be especially useful to market gardeners

**A MARKETABLE
SIDELINE.**

and ourserymen. Where birds are on range, the manure cannot be collected, but where they are in fattening cages, it can be gathered from the floor, and in the laying or breeding houses, from the dropping boards. It should not be kept in the open, where it will rapidly deteriorate, but should be stored under cover. Some people prefer to mix it with earth in the proportion of two parts poultry manure to one of earth. If it is possible to spread it on trays in a shed to dry, so much the better. In addition to nitrogen poultry manure contains phosphates and potash. It is said that a growing bird voids about 25 lb. in six months, and that about 30 adult birds will make one ton of manure in a year.

Feathers are quite a profitable sideline on a table poultry plant and buyers will take them at so much a pound. White feathers always make a higher price than the coloured ones, so they should be kept apart. For purposes of sale, wing and tail feathers must not be put in with the others. Horticulturalists will sometimes take the latter to rot down, or plough in for manure. The feathers for sale should be kept clean, put into clean sacks and hung up out of the way of mice, to dry. When a good quantity is ready for marketing, buyers will often call and collect the feathers, paying for them on the spot. It is estimated that the feathers from 100 average birds (apart from the wing and tail feathers) will amount to 25 lb.

One hardly considers the sale of hatching eggs, day-old chicks, and growing and adult stock as coming under the label of marketing. As, however, **VARIOUS SALES.** holdings are in existence whose sole object is the sale of this class of stock, their disposal may well be considered here. Breeding establishments have their own conditions which govern the sale of hatching eggs; these are usually sold in dozens, 25-50 or 100 and over. It is the rule to replace infertiles once, where dozens are sold, but where 15 eggs to the setting are supplied, then no replacements are made. It is usual to ask for the return of the infertiles before replacement. Proper egg boxes should be used for the despatch of hatching

eggs, as in most cases they will be travelling by rail and the railway companies will not usually accept them if they are improperly or carelessly packed. Whilst eggs will travel well in boxes made for the purpose, some people use saw-dust as packing to make doubly sure.

Day-old chicks are sold straight from the incubator by breeding farms and hatcheries. It is usual to offer to

replace any dying on rail if they are
DAY-OLD CHICKS. returned at once to the vendor. These day-olds are also packed in special boxes, usually in dozen or two dozen lots. The boxes are lined with hay in order to keep the chicks snug in transit.

The sale of day-olds and hatching eggs is confined in great measure to the early spring months, when the weather may be treacherous, hence the care that should be taken in their marketing. Growing stock on the other hand will usually be disposed of in the late spring and summer months. Care must be taken in the sale of birds at eight weeks or three months, or even over, to see that they are not overcrowded in their hampers. If they have far to travel they should be fed and watered before despatch.

Stock cockerels and pullets, or hens for breeding, are generally required for Autumn. It is usual to send these on approval, a stipulation that they be returned in two or three days if not acceptable, being made.

The increasing demand for day-old chicks, both for laying and for table bird production has greatly increased the number of Hatcheries, those buying
SALES OF EGGS TO HATCHERIES. hatching eggs to incubate and sell the day-old chicks. There has also been an increase in the number of breeders who cater for the day-old chick trade in a big way.

A number of farms now mate up stock for the sale of eggs to these hatcheries to the benefit of both parties. Eggs are sold to hatcheries at so much the 100. A bonus is often given for hatchability above a certain standard.

CHAPTER XI

FEEDING

The importance of correct feeding. Requirements of different kinds of stock. Different classes of feeding stuffs. Proteins, Carbohydrates, Fats, Vitamins. How to make up a balanced ration. Starch equivalent. Food units. Notes on various feeding stuffs. Feeding methods. The merits of wet-mash compared with dry-mash feeding. Grain feeding. Specimen rations for all kinds of stock.

CORRECT feeding is of the utmost importance in good poultry keeping. If a year's expenditure on the holding is examined, it will be found that the costs of the feeding stuffs during the year is the largest item. So, however good the stock, however careful the methods of running the place, injudicious, extravagant, or wasteful feeding, can easily be the means of turning a profit into a loss.

The poultry farmer should therefore have a sound working knowledge of the problems of nutrition. The various feeding stuffs in use should be recognisable at a glance, and it should be possible to pick out faulty samples.

PROBLEMS OF NUTRITION.

True, one can always purchase proprietary mashes of excellent quality from firms of reputation; and there is a lot to be said for doing this. A good deal of time is saved where food arrives ready prepared for the

in its body, and it will draw on this for its protein requirements. From a week to the end of brooding, i.e. up to eight weeks, fairly large amounts of protein will be necessary, in the food after which time the amount required diminishes. As laying is about to commence the protein requirements will increase again.

CARBOHYDRATES are a class of substances composed of carbon, hydrogen and oxygen, the two latter being always in the same ratio, of two to one, as they are in water. **SOURCES OF ENERGY.** Carbohydrates act as sources of energy to the body, and the excess is generally stored in the body as fat.

They are cheaper to buy than fats, the common ones being starch, sugar and cellulose. Foods rich in carbohydrates include maize, rice, wheat, barley, oats and potatoes. When laying hens are fed with foods rich in starch, they become too fat, and the output of eggs suffers.

FATS AND OILS are energy formers like carbohydrates but belong to the group of chemical compounds called "esters." They differ from proteins in that they contain only three chemical elements, carbon, hydrogen and oxygen. Fats and oils when acted upon by the digestive ferments, are converted into substances called fatty acids and glycerine. Fats are a source of supply of energy to the body, one pound of fat being equal to about 2½ lbs. of carbohydrates.

While, on the one hand protein may, when fed in excess of requirements, transform the surplus into energy thus replacing carbohydrates, neither fats nor carbohydrates can replace protein.

WATER, is of course, just as necessary for life as solid food is, and animals deprived of it will die in a very short time. It is interesting to note in this respect, that the egg is 68 per cent. water and the body of the hen 58 per cent. water. **IMPORTANCE OF WATER.** The importance of a constant

sugar, fibre, etc.) ; (3) Fats and Oils ; (4) Water ; (5) Minerals ; (6) Accessory food substances (i.e. vitamins).

PROTEINS or flesh formers are found in fish-meal, meat-meal, milk, soya beans, peas, and beans, and in a lesser degree in grains and their by-products.

FLESH FORMERS. They are very important food constituents, and are necessary for all forms of production and for maintenance. Typically the proteins contain the elements carbon, hydrogen, oxygen, nitrogen, sulphur, and sometimes phosphorus.

All proteins are made up of what is known as amino acids. There are a good many of these, though no protein is known to include all of them. The feeding value of a protein depends upon the kind and amount of amino acids it contains. Some are more important than others. Three known as lysine, cystine, and tryptophane are required in fairly large quantities in food given to young stock if normal growth is to be maintained.

During digestion, proteins are split up into their constituent amino acids. These enter the blood stream through the walls of the gut, and are used for the repair or growth of the tissues. Where a protein is fed which supplies an excess of amino acids required by the tissues, the excess is carried to the liver, where it is converted into uric acid, and eliminated by the kidneys. This over-feeding of proteins if persisted in, can be a danger to the health of the birds to say nothing of the waste of money entailed in feeding expensive protein foods in excess of requirements. It will thus be seen how very important it is to feed fowls with a ration containing different kinds of protein, so as to avoid waste of the amino acids, and to make sure all the essential kinds are present, so as to obtain maximum egg production or growth. The amount of protein needed in a ration, will of course vary with the class of stock being fed. For about a week before hatching, a chick has remains of the yolk of the egg

kept in confinement, to make certain that vitamins are present in adequate amounts in the diet.

Vitamin A is the growth vitamin. This is necessary for normal growth and maintenance of health. It is found in yellow (not white) maize and alfalfa meal. Cod liver oil and halibut oil are also rich in this vitamin. Lack of Vitamin A will stop the birds growing and they will develop a most unhealthy appearance, rendering them liable to nutritional roup.

Vitamin B group is required for general health. It is present in all grains, the commonly used feeding stuffs, and in green food. Yeast is rich in Vitamin B. Lack of the vitamin is shown by the condition of the eyes, and causes what is known as polyneuritis (a nervous disorder) in poultry. This group is very complex and is now divided under a number of headings. With a normal mash containing some animal protein such as fish or meat and bone meal and, for breeders and growing chicks, some dried unextracted yeast as well as grain products, little trouble is experienced; but poor growth and hatchability can be caused by lack of Vitamin B.

Vitamin C does not play an important part in poultry feeding. The lack of it causes what is known as scurvy, a disease to which poultry are not susceptible.

Vitamin D is the most important vitamin from the poultry point of view. It is essential for mineral assimilation and without it the development of the bones in chicks and the production of egg shell in laying birds is impossible. Lack of it, or insufficient quantities, causes leg weakness or rickets in chickens. There are three methods of providing Vitamin D: by means of cod liver oil, by providing the birds with ample sunshine or by irradiating them with ultra violet light. Where birds are on range Vitamin D will be obtained from the sunlight. When hens or chicks are kept

and good supply of fresh water can therefore be appreciated. All water containers should be cleansed at frequent intervals. In the winter, when heavy frosts may be expected, they should be emptied every night. If during excessive cold some attempt is made to provide the birds with water with the chill off, the trouble taken will be reflected in the egg yield which will not sustain such a big drop as may occur if the water is very cold.

MINERALS are just as necessary in a ration as other feeding stuffs. The bones of the bird's body are composed largely of mineral substances, calcium phosphate and calcium carbonate. Egg shells contain about 90 per cent. of lime or calcium carbonate. These mineral substances are to a great extent supplied by the ordinary feeding stuffs, but special provision has to be made in some cases

MINERAL SUBSTANCES.

to meet deficiencies by feeding mineral supplements. Calcium for bone and egg shell is provided in oyster shell, limestone grit, or ground limestone. Sodium and chlorine for health and production are given in common salt, and phosphorus for bone in fish or bone-meal. Grass and green foods are rich in minerals, hence the advantage of a good grass range.

ACCESSORY FOOD SUBSTANCES—Vitamins.

It is only in comparatively recent years that research workers have found out that in addition to the proteins, carbohydrates, fats, and minerals contained in feeding stuffs, there is also a number of accessory food factors, necessary for growth and health. These accessory food factors only exist in small quantities, but are sufficient for the purpose stated, and are known as Vitamins. Lack of vitamins in the ration will lead to what are known as "deficiency diseases," and whilst this is not likely to occur with poultry on free range, it is necessary where they are

VITAMINS.

of Crazy Chick at from 3 to 5 days of age. Feeding these chicks with a Vitamin E rich diet will cure most of these chicks. Adding wheat and green food to the diet of intensively kept breeders will prevent this trouble.

In making up rations, the poultryman, whilst taking account of the composition of the foods, should know how to make a balanced ration. This is a BALANCED RATION. ration in which a certain proportion exists between proteins and the energy producers, i.e. the fats and carbohydrates. This proportion is known as the albuminoid or nutritive ratio of the food, and will be alterable for different classes of stock, chickens, growing stock, laying or fattening birds; and the food whilst having the same ingredients, will require them in different proportions.

In working out the albuminoid ratio, the following method is adopted:—One pound of fat is equal in energy to approximately $2\frac{1}{2}$ pounds of carbohydrates, so the fat in the ration is multiplied by $2\frac{1}{2}$ and the result is added to the carbohydrates. The sum of the two is then divided by the amount of the protein which gives the albuminoid ratio.

$$\text{Carbohydrates} \frac{+ (\text{fats} \times 2\frac{1}{2})}{\text{Protein}} = \text{Albuminoid Ratio.}$$

In actual practice it has been found that the albuminoid ratio for various classes of poultry stock should be:—

For laying Stock—1 part protein to $4\frac{1}{2}$ parts energy producing material ($\text{fats} \times 2\frac{1}{2}$) + carbohydrates, or

1 to $4\frac{1}{2}$

For Fattening Stock—1 to 6 or 7.

For Chicks to eight weeks—1 to $4\frac{1}{2}$.

For Growers—1 to 7.

When making up a ration, should it be found that the albuminoid ratio is too wide (containing too much carbohydrate and fat) or feeding stuff having a high percentage of carbohydrates should be reduced, and one with a narrower albuminoid ratio (containing a larger proportion of protein)

intensively the vitamin should be added to the ration, for it must be remembered that sunlight which passes through ordinary glass is of no value for the purpose—the ultra violet light can only pass through special glass. The Vitamin D is therefore supplied through cod liver oil which is rich in this respect. One per cent. is sufficient in most cases. In practice it is also found advisable to add cod liver oil to the ration of the breeding birds and growing birds on range, during the winter months. Chickens will not suffer from the lack of this vitamin during the first six days of their life because the egg yolk in the chicks' body, when hatched, contains enough Vitamin D for that time. Afterwards when the chicks are about ten days old, lack of the vitamin will result in the chicks being unsteady on their legs ; and eventually they will be unable to stand at all, and will die. With laying birds egg production will be low and the eggs will be thin or soft shelled. Both Vitamin D and A can now be had in a dry synthetic form. This is easier to mix in a mash than cod liver oil and is preferred by some for this reason. It is also considered more stable and will not affect the Vitamin E of the diet.

Vitamin E is found in whole grains and green plants. The lack of it will cause birds to become sterile. Where breeding birds are on grass range and are fed properly, there need be no trouble in this respect. Vitamin E is affected by heat and also by any rancidity in the food. Too much cod liver oil, if of a slightly rancid nature (or other rancid fat) in the food may cause a deficiency. In chicks this causes a condition known as Crazy Chick Disease where the chicks, usually at from 10 days to 6 weeks, lose the sense of balance and begin to fall about, often lying on their sides for a long time before death. In such cases whole wheat and green food should be given and the food in use changed to another mixing.

Intensive breeders may lay eggs which are lacking in this vitamin and chicks hatched from them may show symptoms

of Crazy Chick at from 3 to 5 days of age. Feeding these chicks with a Vitamin E rich diet will cure most of these chicks. Adding wheat and green food to the diet of intensively kept breeders will prevent this trouble.

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1 to $4\frac{1}{2}$

For Fattening Stock—1 to 6 or 7.

For Chicks to eight weeks—1 to $4\frac{1}{2}$.

For Growers—1 to 7.

When making up a ration, should it be found that the albuminoid ratio is too wide (containing too much carbohydrate and fat) a feeding stuff having a high percentage of carbohydrates should be reduced, and one with a narrower albuminoid ratio (containing a larger proportion of protein)

substituted. Correspondingly, if it is found that the albuminoid ratio is too narrow, a feeding stuff or feeding stuffs with narrow albuminoid ratio should be reduced in quantity, and others with wider ratios substituted.

In the accompanying Table the only food stuffs mentioned are those the poultryman is likely to come across in his work. It will also be seen that only the digestible percentages of the various feeding stuffs are given, it being considered that these are the actual figures one will want to use in making up a ration.

Here is a ration. If reference is made to the Table, the figures can be followed.

MASH FOR LAYING HENS (1)

| | Protein. | Fats. | Carbo- hydrates. |
|------------------|----------|-------|---------------------|
| 8 lb. Bran | ·84 | ·22 | 3·04 |
| 2 lb. Maize-Meal | ·14 | ·09 | 1·36 |
| 1 lb. Middlings | ·13 | ·04 | ·45 |
| 1 lb. Fish-Meal | ·47 | ·04 | — |
| <hr/> | | | |
| 12 lbs. | 1·58 | ·39 | 4·85 |

GRAIN FEED

| | Protein. | Fats. | Carbo- hydrates |
|-------------|----------|-------|--------------------|
| 1 lb. Wheat | ·09 | ·01 | ·65 |
| 1 lb. Oats | ·08 | ·04 | ·44 |
| 1 lb. Maize | ·07 | ·04 | ·68 |
| <hr/> | | | |
| 3 lb. | ·24 | ·09 | 1·77 |
| <hr/> | | | |
| 1 lb. Masb | ·131 | ·032 | ·404 |
| 1 lb. Corn | ·080 | ·030 | ·590 |
| <hr/> | | | |
| | ·211 | ·062 | ·994 |

ALBUMINOID RATIO OF THE RATION

$$1 \text{ to } [(62 \times 2.25) + 994] \div 211 =$$

$$1 \text{ to } 1133.5 \div 211 =$$

$$1 \text{ to } 5.37 \text{ Albuminoid Ratio.}$$

This ration, working out at one part protein to 5.37 parts of carbohydrates plus fats, is too high in energy-producing feeding stuffs. What is wanted is something in the proportion of 1 to 4½. We must therefore take that part of the mash which is highest in carbohydrates and reduce the quantity, and at the same time increase another feeding stuff carrying more protein. If the Table be examined, it will be seen that the maize, with 68 per cent. digestible carbohydrates, had better be reduced, and the fish-meal increased because that is the food carrying the highest protein content in this mash, viz. 47 per cent.

MASH FOR LAYING HENS (2)

| | Protein. | Fats. | Carbo- hydrates. |
|------------------|----------|-------|---------------------|
| 8 lb. Bran | .84 | .22 | 3.04 |
| 1 lb. Maize Meal | .07 | .04 | .68 |
| 1 lb. Middlings | .13 | .04 | .45 |
| 2 lb. Fish Meal | .94 | .08 | — |
| 12 lb. | 1.98 | .38 | 4.17 |

GRAIN FEED

| | | | |
|-------------|------|------|------|
| 1 lb. Wheat | .09 | .01 | .65 |
| 1 lbs. Oats | .08 | .04 | .44 |
| 1 lb. Maize | .07 | .04 | .68 |
| 3 lb. | .24 | .09 | 1.77 |
| 1 lb. Mash | .165 | .031 | .347 |
| 1 lb. Grain | .080 | .030 | .590 |
| | .245 | .061 | .937 |

ALBUMINOID RATIO OF THE RATION.

$$1 \text{ to } [(61 \times 2.25) + 937] \div 245 =$$

$$1 \text{ to } 1074.25 \div 245 =$$

$$1 \text{ to } 4.38\text{—Albuminoid Ratio.}$$

Here by decreasing the maize one part and increasing the fish meal one part, we have a properly balanced ration for laying hens. Assuming that EQUAL quantities of the mash (dry) and grain mixture are fed to the birds each day, the albuminoid or nutritive ratio will not be altered, whatever weight of food is given.

Whilst it is necessary for poultry rations to have a proper albuminoid ratio, it is also important that other factors should be taken into account. It is quite easy to make up a balanced ration from ingredients quite unsuitable for poultry. The vitamia content and the minerals must be noted. It is useless to give feeding stuffs which the birds cannot easily digest. From experiments carried out, it has been found out that the digestion of poultry is similar to that of other animals, except that very little fibre can be digested. Fibre should therefore be fed only in small quantities, not more than 6 to 8 per cent. of the ration. It is also said that animal foods are easier of digestion than vegetable foods.

The function of the gizzard of a hen, being to reduce the food to such a state that the digestive juices can act upon it, the feeding of grit is a great aid to the grinding efficiency of this organ. Grit should be supplied to all birds where, on range, a plentiful supply is not found, or where they are kept under intensive conditions. Palatability is most important and should not be overlooked in feeding. Hens have their likes and dislikes. Musty or stale food may cause trouble and should be avoided. Whilst sudden changes must not be made in the rations, hens like variety, and the best rations are those made up of several kinds of feeding stuffs.

NOTES ON THE COMPOSITION OF SOME OF THE COMMON
POULTRY FEEDING STUFFS (COMPILED FROM VARIOUS SOURCES)

| | Dry Matter | Digestible Percentage | | | Fibre | Ash | Nutri- tive Ratio 1 to |
|-----------------------------------|---------------|--------------------------|-------------------------|------|-------|------|---------------------------------|
| | | Pro- tein | Carbo- Hy- drates | Fats | | | |
| Alfalfa Meal .. | 89.3 | 9.2 | 22.0 | .9 | 31.0 | 8.4 | 2.0 |
| Barley | 85.1 | 6.5 | 62.2 | 1.2 | 4.5 | 2.6 | 10.0 |
| Beans | 86.0 | 19.0 | 48.0 | 1.25 | 7.0 | 4.5 | 2.7 |
| Biscuit Meal.. .. | 90.6 | 12.5 | 68.5 | 0.6 | 0.3 | 2.7 | 6.0 |
| Brewer's Grains: (Wet) | 24.0 | 3.75 | 10.0 | 1.25 | 5.0 | 0.25 | 3.4 |
| Brewer's Grains: (Dry) | 91.0 | 13.5 | 34.0 | 5.5 | 17.0 | 5.0 | 3.5 |
| Buttermilk | 9.9 | 3.0 | 5.4 | 1.0 | — | 0.5 | 2.6 |
| Cabbage | 15.0 | 1.5 | 7.0 | 0.5 | 2.0 | 2.75 | 5.4 |
| Fish Meal | 87.0 | 47.0 | — | 4.0 | — | 26.0 | 0.2 |
| Earth Nut Cake Meal | 90.0 | 41.0 | 21.0 | 7.0 | 6.0 | 5.5 | 0.9 |
| Maize and Maize Meal | 89.0 | 7.0 | 68.0 | 4.5 | 2.0 | 1.5 | 11.4 |
| Milk (whole) .. | 12.5 | 3.25 | 4.75 | 3.75 | — | 0.5 | 4.1 |
| .. (dried skim) | 89.8 | 29.6 | 48.8 | 0.3 | — | 7.9 | 2.0 |
| .. (wet ..) .. | 9.5 | 3.75 | 4.5 | 0.75 | — | 0.75 | 1.9 |
| .. (separated) .. | 9.0 | 3.5 | 5.0 | 0.1 | — | 0.15 | 1.5 |
| Maize Germ Meal | 89.0 | 9.0 | 51.0 | 11.0 | 4.0 | 4.0 | 8.5 |
| Meat Meal | 89.2 | 55.7 | — | 12.5 | — | 3.8 | — |

| | Dry Matter | Digestible Percentage | | | Fibre | Ash | Nutri- tive Ratio 1 to |
|-----------------------------------|------------|-----------------------|-------------------------|------|-------|------|---------------------------------|
| | | Pro- tein | Carbo- Hy- drates | Fats | | | |
| Meat and Bone Meal | 90.8 | 39.0 | — | 9.4 | — | 23.1 | — |
| Oats and Sussex Ground Oats .. | 86.7 | 8.0 | 44.8 | 4.0 | 10.3 | 2.8 | 7.0 |
| Palm Kernel Meal | 90.0 | 16.0 | 47.0 | 1.75 | 16.0 | 4.0 | 3.2 |
| Peas | 86.0 | 17.0 | 53.0 | 1.0 | 6.0 | 1.5 | 3.25 |
| Potatoes | 25.0 | 0.1 | 19.0 | 0.1 | 1.0 | 0.75 | 192.0 |
| Rice Meal | 91.0 | 7.0 | 42.0 | 11.0 | 7.0 | 8.0 | 9.6 |
| Soya Bean Meal (extracted) | 88.7 | 40.3 | 24.7 | 1.4 | 5.1 | 5.5 | 0.7 |
| Wheat | 87.0 | 9.0 | 65.0 | 1.25 | 2.0 | 2.0 | 7.5 |
| Wheat Middlings.. | 86.5 | 13.8 | 45.5 | 4.3 | 5.3 | 6.1 | 4.0 |
| Wheat Bran | 86.4 | 10.6 | 38.0 | 2.8 | 10.6 | 5.8 | 4.0 |
| Whey | 7.0 | 0.8 | 5.0 | 0.25 | — | 0.75 | 7.0 |
| Yeast (dried) .. | 95.7 | 41.6 | 29.2 | 0.2 | 0.5 | 10.7 | 0.7 |

STARCH EQUIVALENT

Many of the published tables which give the composition of feeding stuffs include a column headed "starch equivalent." This shows the starch value of the digestible food stuffs in each 100 lb. of feeding stuff, and is useful for comparing one food with another. The starch value can be found by multiplying the digestible fats by the factor 2½, the digestible protein by 0.94, and adding the result to the digestible carbohydrates.

* Bran = 2.8×2.25 plus 10.6×0.94 plus $38.0 = 54.3 =$
Starch equivalent.

FOOD UNITS

An idea of the money value of one food stuff as compared with another is useful in making up a ration. This can be found by taking the percentage of proteins, fats and carbohydrates and turning them into terms of food units. Both the proteins and fats are multiplied by $2\frac{1}{2}$ and then added to the carbohydrates to give the number of food units. This number divided into the price, will give the cost per food unit.

Example :

| | Barley. | | Maize. | |
|---------------|----------------------------|--|---------------------------|--|
| Protein | $6.5 \times 2.25 = 14.625$ | | $7.0 \times 2.25 = 15.75$ | |
| Fats | $1.2 \times 2.25 = 2.70$ | | $4.5 \times 2.25 = 10.12$ | |
| Carbohydrates | $62.2 \times 1.0 = 62.20$ | | $68.0 \times 1.0 = 68.00$ | |
| | <hr/> | | <hr/> | |
| | 79.52 | | 93.87 | |
| | <hr/> | | <hr/> | |
| Price per ton | £20 | | £20 | |
| cost per unit | 5/- | | 4/3 | |

This shows that maize at £20 per ton is a cheaper food than barley at the same price, if used in a properly balanced ration.

NOTES ON VARIOUS FEEDING STUFFS.

ALFALFA MEAL is dried Lucerne and is a useful feed for laying stock. Yolks are improved in colour by its use. Its fibre content is high and this prevents its liberal use.

BARLEY is not extensively used in poultry rations. Where fed indiscriminately trouble has been caused, but experimental work has shewn that it may very well be used in a properly balanced ration. Barley meal is often used with success in fattening rations.

BEANS, which are fed as meal, are rich in proteins but deficient in fats.

BREWERS' GRAINS are rich in proteio, highly digestible, and a useful food for laying stock. Probably owing to their bulkiness and cost of transport, they are not so much used as they might be.

FISH MEAL is rich in protein and can be fed to all kinds of stock. If not fed in excess of 10 per cent., there is no fear of the eggs, or flesh of fowls being tainted.

MAIZE is extensively used in poultry feeding, both in its kibbled state and as meal. Essentially a carbohydrate food it contains very little fibre. Yellow maize is used in nearly all cases. With layers, it has a definite influence on the colour of the yolk. White maize meal is used a great deal in fattening mashers, because the yellow variety has a tendency to increase the yellow colour in the fat of the bird.

MAIZE GLUTEN is a by-product from the making of glucose and starch. It is rich in protein. **MAIZE GERM MEAL** (a by-product in making corn flour) is rich in oil, and care must be exercised in its use, as, in excess, it is bad for the birds.

MILK is extensively used in feeding young chicks and in fattening birds for the table. It is also employed in rations for growing and laying stock, when it can be purchased at a reasonable figure. Milk is used either in its liquid form or dry and is either skimmed or separated. **WHEY** resulting from cheese making, does not possess the high proteio content of other milk products, being chiefly a carbohydrate food, but is valued for its mineral and vitamin content.

MEAT MEAL AND MEAT AND BONE MEAL are rich in protein. They can be used in place of fish meal.

OATS and SUSSEX GROUND OATS. Oats are a useful food, though not used now to the extent they were some years ago. Valuable for its mineral and oil properties, its high fibre content makes it less acceptable than wheat. **SUSSEX GROUND OATS** have always been a stand-by in the fattening yard, and they are also used extensively in chick

mashes. The whole oat, including the husk, is ground to meal in making **SUSSEX GROUND OATS**. This is very different from crushed oats. When grinding, a little barley is often included with the oats.

PALM KERNEL MEAL can be given in a mash to replace some other cereal by-products, but it should be used with caution owing to its unpalatability if fed in large quantities.

PEAS, like beans, are fed as meal. They are rich in protein, but deficient in fat.

POTATOES are a carbohydrate food. Chat potatoes have always been used in mashes for poultry, but it is only recently that experiments have shown that they can be used to a much greater extent in a mash. As a war-time measure steamed potatoes were used in a layer's ration with success to the extent of 70 per cent, the rest of the mash being made up of middlings and fish meal. In rearing chicks from day old also, steamed peeled potatoes have constituted 70 per cent. of the mash with good results in growth.

RICE is a carbohydrate food and is low in protein. Some years ago rice was used in chick feeds a good deal. It is highly digestible and probably the cost is the reason for its limited use now. Care should be taken in purchasing **RICE MEAL**. It consists of the bran and polish removed when the seed is being prepared for human consumption, and owing to the oil it contains readily goes rancid on storage.

SOYA BEAN MEAL (extracted) in its protein content is somewhat similar to milk. With it minerals are usually fed; but some animal protein should be fed with it.

WHEAT (including the by-products **BRAN** and **MIDDLINGS**). One of the most used grains in poultry feeding. It can be employed for all classes of stock. **BRAN** is the outer covering of the wheat, and is generally used to add bulkiness to the ration. It is useful, both as a source of protein and of

Vitamin B, but has a high fibre content. Owing to its bulkiness it is not used in large amount in chick mashes. **MIDDLINGS** (sometimes known as **SECONDS** or **THIRDS**) in different parts of the country), is the residue in the milling of wheat flour, and is extensively used in poultry mashes for all stock. Samples vary a good deal, there being sometimes very little difference between fine bran and middlings.

DRIED YEAST is fed to young chicks, growing, breeding, and laying stock, for its high protein and vitamin content.

FEEDING METHODS. Feeding time is the best opportunity the poultry farmer gets to have a good look over the birds and see if anything is wrong, so time spent on feeding is never wasted.

FEEDING. Where dry-mash feeding alone is practised it will not be so easy, for the birds will be at the hoppers in twos and threes all day. With wet-mash feeding or when corn is given, one can get practically all the birds close at hand.

There are several systems of feeding, the old way with wet-mash, and the more modern practice of mash fed dry, and grain feeding. It is possible to feed dry-mash successfully, without giving any grain whatever. Grain alone can also be fed. This is still the practice where birds are a sideline on the general farm, and have the run of the farm-yard. To feed grain alone would not be economically sound on a poultry holding, nor would it, except in the spring flush, make for the maximum egg-production. On most farms it will be found that dry- or wet-mash is fed in conjunction with a grain feed.

To prepare a wet-mash does not mean taking a dry-mash mixture and adding water to it. It is not so simple as that, if it is done properly, although it is a

WET-MASH. method often practised. Such ingredients in the ration as maize meal, Sussex Ground Oats, wheat meal, and fish- or meat-meal, should be steeped in hot water and left for a time. When

thoroughly soaked the mixture can be dried off by the middlings and bran in the mash. Bran should not be soaked. Care must be taken not to use too much water, but only sufficient to be thoroughly absorbed by the different ingredients. Wet-mash feeding is a great advantage where only a few birds are kept, or where a large institute or school is running a poultry department, for kitchen waste and surplus garden produce may with advantage be incorporated in a wet-mash. When ready for use the mash should be in a crumbly state, not in a sloppy condition. It should always be fed in troughs. Never scatter it on the ground where it can go mouldy, and become a menace to the birds. One drawback to wet-mash feeding is the labour it entails on a large holding. The preparation, mixing, and carting round the food every day does take up an amount of time which some might think could be more profitably employed in other directions. At the same time there is probably not so much wastage from spilt food or possibly from vermin, when wet-mash feeding is practised.

DRY MASH FEEDING. Dry Mash Feeding is practised extensively. It has many advantages. The food can be mixed in bulk once or twice a week, and carted round to the different houses. The saving of time and labour is obvious. Dry-mash is fed in hoppers, which in the case of the larger houses, are fitted inside the house, at such a height from the ground as to make it readily accessible to the birds. Since in most cases the hoppers are open all day or most of the day, there is not that scramble which occurs amongst the birds in wet-mash feeding, and all of them have ample time for satisfying their appetites. Dry-mash feeding can be very wasteful if a proper kind of hopper is not used.

The custom in some quarters of leaving the hoppers open all night is not to be recommended, as it attracts vermin, and rats can make a big inroad into the mash if given the opportunity. For the same reason, galvanized hoppers are better

thao woodeo ooes. It has been said that dry-mash feeding is not so satisfactory, and does not give such good results as wet-mash. Experimenta! work does not bear out this contention, except io cases where the mash, when fed dry, proves uopalatable. Io such cases, wettiog the mash may result in ao improvement. Equally good results have beeo obtained on both systems, and the one to use is merely a matter for the poultry farmer to decide for himself. The persooal element in feeding couots for a good deal, and however excellot the food, good results will not be achieved unless the hirds are properly fed. It is to be deprecated that more care is not takeo with the feediog oowadays. To throw the graio down all in a heap is not a good practice. A certain amouot of grain feeding is advantageous, for not ooly does it provide variety in the diet, but it is easy to feed, and keeps the gizzard properly employed. If not given until just before it gets dark, then it is better to feed it in troughs. If fed io the morning, it should be scattered in the litter especially io the large iotensive or semi-intensive houses. This will get the birds scratching and actively employed. For the same reasoo, it'cao be broadcast on range after the hirds are let out, if the weather be suitable.

Where mash and grain feediog are practised, it is usual to feed two ounces of grain per bird per day, oo the assumption that an adult bird will consume approxi-

GRAIN.

mately four ouoces of food per day, and it is desired to give two ouoces of mash and two ounces of grain. A hard and fast rule should oot be made in this direction for it is a good thing to let the birds have all they will eat of a well balanced ratioo. However, let half of it be grain. Wet-mash may be given in the morning and grain at night or the order may be reversed. It used to be conteoded that grain remaioced io the crop longer than the mash, and that was the reason for the custom of feeding the grain later in the afternooo. Experiment has proved the contention to be incorrect.

When feeding corn in conjunction with dry-mash, it is a good thing to give say half an ounce of grain to the litter in the morning per bird. The dry-mash hoppers should be left open all day, giving the balance of one and a half ounces of grain as the last feed, in the trough for preference. Some feeders in addition to giving dry mash and grain, will feed a small quantity of wet-mash at midday, especially during the winter months.

There is no one correct system to follow. The keen poultryman will adopt a certain way of feeding, and watch results. If he feels that he can do better by changing his methods he will be wise to make the alteration.

PELLET FEEDING (that is dry-mash made up in the form of pellets), is being followed by some poultry keepers who use the battery system. An advantage in using pellets is that there is little waste in feeding. The use of all pellet feeding for intensive stock of all ages helps to induce cannibalism and is only recommended for laying batteries.

RATIONS FOR CHICK REARING (Parts by weight)

| | Day old to 8 weeks. | From 8 weeks on. |
|------------------------------------|------------------------|---------------------|
| Middlings | 20% | 25% |
| Barley meal | 30% | 25% |
| Ground oats | 18% | 35% |
| Maize meal | 10% | — |
| Fish, meat & bone or whale meal | 10% | 8% |
| Grass meal | 5% | 5% |
| Dried skimmed milk | 3% | — |
| Dried yeast (unextracted) | 2% | — |
| Poultry minerals | 1% | 1% |
| Cod liver oil | 1% | 1% |

The ration from day old to 8 weeks is for feeding as a dry mash *ad lib* and without the addition of grain. That from

8 weeks is to be fed with a grain feed of about $\frac{1}{2}$ oz. per chick per day to 12 weeks, 1 oz. per day from 12 to 16 weeks and 2 oz. after to laying.

Ground wheat can take the place of maize meal. One of the dry A and D vitamin supplements may take the place of cod liver oil.

The grain feed for the 8 weeks on should be wheat to 14 weeks ; after which it can be a mixture of wheat, oats and barley. Maize can be included if the price is low enough.

Mineral mixtures. A mineral mixture can be purchased ready made or one can be made up as follows :

| | |
|------------------------|---------------|
| Ground limestone flour | 50 lb. |
| Steam bone flour | 25 lb. |
| Common salt | 23 lb. 14 oz. |
| Manganese sulphate | 1 lb. |
| Copper sulphate | 1 oz. |
| Iron sulphate | 1 oz. |

TURKEY RATIONS.

| | From day old to 8 weeks. | 8 weeks on. |
|--|-----------------------------|-------------|
| Middlings | 20% | 20% |
| Barley meal | 24% | 20% |
| Ground oats | 20% | 27% |
| Maize meal | 10% | 10% |
| Fish, meat & bone or whale meal | 10% | 8% |
| Grass meal | 7% | 10% |
| Dried skimmed milk | 3% | — |
| Dried yeast (unextracted) | 3% | 2% |
| Mineral mixture | 2% | 2% |
| Cod liver oil or Vitamin A & D supplement | 1% | 1% |

The above are to be fed without grain. Green stuff and/or roots such as fodder beet can be given in addition.

The mineral mixture for turkeys should be :

| | |
|------------------------|--------------|
| Ground limestone flour | 50 lb. |
| Steam bone flour | 25 lb. |
| Common salt | 23 lb. |
| Manganese sulphate | 1 lb. 14 oz. |
| Copper sulphate | 1 oz. |
| Iron sulphate | 1 oz. |

Breeding turkeys can have the same ration as breeding hens.

DUCK RATIOMS.

Laying Ducks.

| | |
|------------------|-----|
| Middlings | 25% |
| Barley meal | 45% |
| Maize meal | 10% |
| Fish meal | 12% |
| Dried grass meal | 5% |
| Mineral mixture | 2% |
| Cod liver oil | 1% |

The above to be fed as a wet mash twice a day, about 7 oz. per duck when in full lay. No grain feed.

The mineral mixture should be as for Turkeys.

Breeding ducks should have the same mash as for breeding hens ; but fed as a wet mash. No grain.

Ducks intended for table should be fed on the Chick Mash, day old to 8 weeks for the whole of the period. Table ducks should be killed at from 9 to 10 weeks of age.

Ducklings intended for laying or to be kept for breeding should be fed as for chickens to the laying stage.

GESE

The Goose is a grazing bird and needs little feeding if on a good pasture. For the first two weeks geese can have the baby chick mash, fed as a wet mash. They should be on grass as soon as possible, at a day old is not too soon. While the grass is short and good they will need no feeding

until about 6 to 10 weeks before killing, earlier if the grass is poor, when a feed of boiled potatoes or fodder beet dried off with barley meal will be suitable for fattening.

Breeding geese can be given a wet mash as for fattening but 5% of fish or meat and bone meal or 10% of pea or bean meal plus 2% of the mineral mixture, as for chicks, added.

One feed a day will be enough.

To pay, geese must be made to eat as much grass as possible. They then become one of the most profitable birds on the farm, producing meat and eggs more cheaply than any other farm stock.

GUINEA and PEA Fowls can be reared and fed as for chickens.

FATTENING RATIONS (TABLE CHICKENS).
(For Cramming.)

| | |
|--|----------|
| (1) Sussex Ground Oats | 13 parts |
| Dried Skim Milk (the Sussex Ground Oats and milk to be mixed with water to a consistency of thick cream) | 1 " |
| One part of mutton fat added to above for fattening. | |
| (2) Maize Meal (White) | 6½ parts |
| Sussex Ground Oats | 6½ " |
| Dried Skim Milk | 1 " |
| (3) Barley Meal | 6½ parts |
| Sussex Ground Oats | 6½ " |
| Dried Skim milk | 1 " |

LAYER'S RATIONS.

To be fed with grain 2 oz. a day.

Deep litter or hen-yard. On range.

| | | | |
|-------------|-----|-----|-----|
| Middlings | 20% | 20% | 20% |
| Barley meal | 25% | 25% | 40% |
| Ground oats | 20% | 24% | 24% |

LAYERS' RATIONS.

To be fed with grain 2 oz. a day.
Deep litter or hen-yard. On range.

| | | | |
|--|-----|-----|-----|
| Maize meal | 10% | — | — |
| Fish, meat and bone or whale meal | 14% | 8% | 14% |
| Pea or bean meal | — | 12% | — |
| Mineral mixture (see page 184) | 2% | 2% | 2% |
| Cod liver oil or Vitamin A & D supplement | 1% | 1% | — |
| Grass meal | 8% | 8% | — |

The above mashes are intended to be fed dry and *ad lib.* Wet mash feeding can be used in the case of birds on range; in this case the birds should be given at least 3 hours to clear up. If they do so before this more should be given. Roughly 3 oz. per bird of the mash (dry weight) will be needed per bird per day plus the 2 oz. corn.

Laying battery mash or where an all mash ration is used:—

| | |
|--|-----|
| Middlings | 20% |
| Barley meal | 25% |
| Ground oats | 25% |
| Maize meal | 10% |
| Fish meal, meat & bone meal or whale meal | 10% |
| Grass meal | 8% |
| Mineral mixture | 1% |
| Cod liver oil or Vitamin A & D supplement | 1% |

Feeding for broilers and table chicks on range or deep litter.
 Feed as for day old to 8 weeks (page 183) then give the ration for 8 weeks on ; but without the grain feed, up to 12-14 weeks of age when birds should average 4 to 5 lb. in weight.

If it is wished to rear to greater weights, the same mash can be given with a grain feed or the mash may be diluted with equal parts of ground oats.

It is not necessary to give any wet mash ; but if wished (or should the appetites of the birds fail), a wet mash can be given once a day in order to get them to eat more. Dry mash should always be before them as well.

BREEDERS' RATIONS.

| | |
|--|-----|
| Middlings | 25% |
| Barley meal | 20% |
| Ground oats | 20% |
| Fish meal, meat & bone meal or whale meal | 8% |
| Maize meal | 7% |
| Grass meal | 5% |
| Dried yeast | 3% |
| Dried skimmed milk | 2% |
| Mineral mixture | 2% |
| Cod liver oil or Vitamin A & D supplement | 1% |

Can be fed as a dry mash, *ad lib*, or as a wet mash, about 3 oz. (dry weight) per breeder per day.

2 oz. of grain should be fed per breeder per day with this mash. Wheat should form all or the major part of the grain ration.

Feeding proprietary ready mixed mashes.

There are a number of good proprietary mashes on the market which can be used in place of those suggested. Chick rearing mashes or "starter" mashes are for the first 8 weeks and should be fed without any grain. Growers mashes for 8 weeks on should also be fed as the only food.

Laying mashes, laying battery mashes or intensive laying mashes should be fed alone and without grain.

Grain Balancer mashes or High Protein mashes for

layers are to be fed with a grain feed of not more than $1\frac{1}{2}$ oz. per bird per day.

All the above can be had in pellet form, a small pellet called "crumbs" is available for chicks.

CHAPTER XII

DISEASES

The necessity for cleanliness. Treating ordinary ailments. Steps taken to prevent disease. Identifying various symptoms. Short description of some of the common poultry diseases.

It is of vital importance that the poultryman should have some knowledge of the diseases that he may possibly run up against in the course of his work.

KNOWLEDGE OF THE DISEASES. He should also know what initial steps to take to counter any outbreak (especially in infectious cases), pending the arrival of professional help. Whilst he should not deal with a serious outbreak, or with something he does not understand, without expert assistance, there are ailments, the cure of which he can very well undertake. Above all, he should be thoroughly conversant with all the preventive measures necessary to keep certain diseases at bay. It may be the means of saving him a good deal of money and worry in the long run, and it is a duty he owes to his fellow poultrymen. Perhaps one of the penalties of keeping birds in large numbers is that they are really not seen so thoroughly or so frequently as used to be the case. As a rule, there is so much to do and so little time in which to do it. At the same time every endeavour should be made to look over the stock when possible. When wet-mash feeding was the rule, opportunity was always had to run an eye over the birds. The same applied when corn feed was given. Now, with dry-mash feeding, the generally accepted practice—and in some cases with no additional corn feed—the every-day inspection has fallen into abey-

ance. There is always a danger when no inspection is regularly undertaken, that a common cold will be overlooked, sometimes with serious consequences. In particular where large houses are used, it is a good practice to visit them after nightfall, so that in the quiet of the night a bird suffering from the beginning of a cold can be readily detected, removed, and promptly treated. Cleanliness in the houses, and with feeding and watering utensils, is essential. As we have said, most poultry houses are fitted with dropping boards under the perches. These should be cleaned as a matter of routine at least twice a week, every other day would be better. All water vessels should be kept clean, and the vessels scrubbed out with hot water at least once a week. Perches and other fittings should be movable. A thorough cleansing of house and fittings is most usefully done when the house is empty, and before the pullets are brought in for laying. Litter should be renewed as often as required, generally about twice a year, and the whole removed and burned when the annual cleaning takes place. The ground immediately outside the house should also have attention. Whether the extensive or the semi-intensive system is used, unless the house can be moved occasionally, it will be found advisable to clean up thoroughly the ground immediately surrounding the house, and cart the droppings away. Even if the runs are of grass, the ground will be found to get bare in front of the outlets in a very short time. All houses should be so placed that they get the maximum amount of sunlight playing on them, and the ventilation should be such that a good supply of fresh air (not a draught) is available. When a bird has been removed and isolated owing to suspected trouble, unless it is soon well again, it is questionable whether, on an ordinary commercial holding, it is advisable to keep it. It is understandable that the farmer or pedigree breeder will want to keep a valuable bird, but the ordinary layer, even if cured, will not eventually be put into the

breeding pen. It is doubtful whether she will come into lay again or prove a profitable bird. Such being the case she is probably better killed so that she ceases to be a menace to the rest of the birds.

New stock should never be put in with one's own hens at once, but kept isolated for a few days ; especially is this

NEW STOCK. necessary when the birds have come a long distance. Though not apparent at the time, they may develop a cold

and it can be dealt with effectively if they are by themselves. Examine the birds on arrival for physical defects. Examine the mouths ; here any white or yellow patches may denote roup and will call for prompt action. Body lice should be looked for. Naturally, purchased birds, which arrive suffering from any ailment, or showing signs of illness, should be returned to the vendor. It should always be one of the conditions of sale that such birds are returnable. All dead birds should be burned if possible. If they are not, they should be buried in lime in a deep pit.

How should one know when a bird is unwell ? Disinclination to take food is a sign, so is a discoloured comb or a half alive looking appearance.

Diseases to which poultry are susceptible may be grouped roughly—with examples—for the poultry farmer as :—

Ailments due to management or feeding : bumble foot, visceral gont, crop hindng, sour crop, cannibalism, feather pecking, egg eating.

Caused by parasites :

External—lice, fleas, and mites.

Internal—parasitic worms, coccidiosis.

Caused by fungi or moulds : aspergillosis and favus.

Non-infectious diseases : rickets, peritonitis.

Caused by virus : fowl paralysis, fowl pox, contagious catarrh.

Caused by germs : bacillary white diarrhoea (B.W.D.).

Affections of the ovary and oviduct are of fairly frequent occurrence in these days of high producing hens. *Prolapsus* or *protrusion of the oviduct* can readily be seen, and is caused through straining to pass an egg, part of the oviduct protruding through the vent. To treat this trouble, wash the part protruding in warm water, and after applying vaseline, gently return the organ with the finger. The bird should be better after a few days on a light diet of soft food.

A hen may become *egg bound* (unable to pass the egg), possibly through its being unusually large. In this condition it will be noticed that the hen will keep visiting the nest without result, and will show signs of distress. She can often be relieved by holding her with the vent close over a jug of boiling water, when the egg can be got away. One must be very careful in handling a bird suffering in this way for if the egg be broken, it will probably be impossible to save her, and she should be killed. When the egg is removed, the hen should be put on a light diet for a few days.

Affections of the legs and feet include leg weakness, and bumble foot. *Scaly leg* is very unsightly and is caused by a mite which hurrows underneath the

LEGS AND FEET. scales of the leg. In bad cases the scales seem to swell out into large lumps and then crack, causing bleeding. The shanks should be dipped into paraffin, or better still the paraffin should be applied and well brushed in with an old brush. *Leg weakness* may occur both in young chicks and in adult stock. With the young stock it may be due to lack of Vitamin D, caused by a want of sunlight, or the absence of cod liver oil from the mash. On the other hand it may be caused by overheating in the brooders. In older birds, leg weakness may be caused by rheumatism, and the legs should be treated by bathing them in warm water, and after drying them rubbing in embrocation or turpentine. Leg weakness in adult birds should not be confused with fowl

paralysis (neuro-lymphomatosis), a disease which has been very prevalent in the poultry industry in recent years.

A growth, usually an abscess, on the bottom of the foot, which will sometimes be found in adult stock, is known as *Bumble foot*, and is usually caused through the hen flying down from a high perch on to a hard floor, or to ranging on very hard and stony ground. Bumble foot is very painful for the bird, which will soon become lame. The abscess should be pierced with a sharp clean knife, and the pus squeezed out; the wound should then be thoroughly cleaned with a weak solution of carbolic solution. The foot should be kept bandaged for a few days, or the bird kept isolated on clean straw for the same period. A fibrous-tissue pad sometimes develops as a result of repeated concussion in cases where there has been no penetration of infection through a wound. The pad acts as a cushion and is permanent. No attempt should be made to lance it. Evidence of pain or marked lameness is not a feature of this condition.

External Parasites : Lice, Fleas and Mites. Constant watch should be kept for vermin of the insect and allied classes. One does not see the dust-bath so customarily established on poultry farms to-day as it was some years ago. It is very useful and the hens can be relied upon to make good use of it if it is kept in order and properly attended to, being cleaned out when necessary, and renewed with fresh clean earth, or better still, with finely sifted ashes. The straw or hay in the nests should be renewed as occasion demands, and the nest boxes ought to be kept clean. The birds should also be watched, and if lice are suspected, they should be treated with sodium fluoride, a pinch being put among the feathers in various parts of the body, particular attention being paid to the fluff under the wings, and to the area round the vent. The sodium fluoride should be kept away from the eyes of the bird, and not allowed to get into the vent. Mites can be a great

nuisance, and watch must be kept for them as they are most active at night time. Their hiding places are cracks in the walls of the house, and they are particularly partial to the sockets in which the perches rest. Here will be found the Red Mite, so called from the red colour it exhibits when it has been attacking and drawing blood from the hens during the night. Every attempt must be made to keep this pest under control. Houses should be thoroughly creosoted and lime-washed if necessary, when empty. During the year, perch sockets should be treated occasionally with a dab of paraffin, or with creosote, and the perches themselves should be painted with nicotine sulphate, which is a particularly effective treatment for lice. *De-pluming Mites* are parasites which attack the bases of the feathers, causing them to fall out. Sulphur ointment should be thoroughly rubbed into the affected parts. *Internal Parasites* : *Gapes* in chickens is caused by small worms which multiply in the windpipe. The trouble can be recognised by the chick wheezing a lot and running about in a distressed condition with beak open. The chick should be caught up at once, and a feather that has been dipped in turpentine worked up and down the windpipe. This will probably dislodge the worm, or worms, which are then coughed up. The chicks should be removed to a fresh piece of ground to avoid further infection. *Flat and Round Worms*. Where poultry are affected by parasitic worms, the vitality of the stock may be quickly and seriously lowered. Flat worms which can hardly be seen by the naked eye are found adhering to the lining of the small intestine. These are only found in adult fowls.

The small round worms are found in the caecal tube or blind gut, and are about a quarter to half an inch in length. Large round worms confine themselves to the small intestines, and look like long pieces of string where several are entwined together.

Treatment is difficult, for where the round worm is

simply expelled from the bird and not killed, reinfestation can take place.

Proper advice should be sought where worm infestation is suspected, for, if a proper job is to be made of cleaning up the trouble, not only must the birds be treated, but the land also on which they have been running. *Tapeworms*, which are relatively common fowl parasites, can be detected by the appearance of the whole or part of the worm in the droppings. They are flat and like ribbons, and affect the domestic hen, adhering to the wall of the intestine. A few worms may not affect the health of the bird, but the fowl will soon go out of condition if the worms are numerous. Turkeys and geese are very susceptible to tapeworm infestation, but ducks, though they harbour the worms, are rarely affected. Birds affected will often suffer from diarrhoea, after a time they become thin, and very weak and death may supervene. Tapeworm eggs are expelled by the hen with the droppings. These eggs do not infect a fowl until an intermediate stage has been passed in the body of some small form of animal life, such as a snail or a slug. Poultry will become infected by eating these snails or slugs which are known as, intermediate hosts. The Ministry of Agriculture advises in an outbreak of this kind, to treat the land over which the birds have been running with a mixture of two parts copper sulphate to eight parts of fine sand broadcast at the rate of 3 cwt. to the acre, or 1 lb. to every 15 square yards: this is in order to destroy slugs and snails which may be spreading the trouble.

Sometimes birds will be found to be in what is known as a *Crop-bound condition*. This is due to an obstruction in the passage leading from the crop to the stomach. It is usually recognisable by the distension of the crop to a marked degree. It will often be caused by birds eating old tough grass which becomes bound like a soft ball in the crop. Sometimes massaging or kneading the crop with

the fingers and giving a dose of oil—repeating the process every two hours—will give the necessary relief. Failing this the crop must be opened with a sharp knife by making a perpendicular cut a little more than an inch long in the upper part of the crop. Then all the contents should be removed, and the crop washed out thoroughly with warm water. Finally each skin should have a few stitches put into it to close it up. For a few days it is well to keep the bird isolated, giving it a soft mash feed for a few days, and skimmed milk if available.

Soft Crop must not be confused with crop binding. The crop is distended in the same way, but is filled with a watery fluid. This can be got rid of by holding the head of the bird downwards and gently massaging the crop, the operation to be repeated until all the fluid is evacuated. The bird should be well after a day or two, on a light warm mash diet.

Of all the diseases that young chicks are liable to, Bacillary white diarrhoea and coccidiosis are responsible for an enormous number of casualties yearly, and yet if effective precautions be taken, these diseases cease to be a menace.

Bacillary White Diarrhoea or Pullorum disease usually attacks chickens during the first week after hatching: it is then that most of the casualties will occur, although losses may still follow for a week or two later. Chickens affected with this disease appear listless, with dropped wings, and the feathers around the vent become pasted up with a whitish matter. Mortality may be very high in a short time, and it will be possible to pick out dead chickens two and three together at all hours. The disease is caused by an organism called *Salmonella pullorum*. This infects the ovary of the hen. Chicks hatched from eggs from an infected hen, may affect healthy chicks from other eggs being incubated at the same time and the disease will make its appearance soon after hatching. Chicks which recover

from Bacillary White Diarrhoea are a potential danger, for they may retain the causative organism in their bodies, and this may later make its way into the ovary. Chicks can contract the disease from the droppings of infected chicks. The sure and proved way of preventing it, is to use only eggs from stock that is not affected. Hens are tested for the presence of Bacillary White Diarrhoea by what is known as the Agglutination test, a blood test which will be done for poultry farmers by a Veterinary Laboratory at a small charge. So reliable has this test proved that it has now become the custom for purchasers buying new stock to insist on a guarantee that the stock from which hatching eggs, day-old chicks, or growing stock has come, has been subject to the Agglutination test and has been found free. Laboratories that undertake the Agglutination test for poultry farmers send out explanatory leaflets on how to collect blood samples. A quicker test undertaken on the spot is known as the *rapid test*, and is now used in almost all cases.

Where a poultry farmer has been unfortunate enough to have an outbreak of this disease, he must take drastic steps in cleansing and disinfecting his incubators and brooders in a thorough manner.

Coccidiosis is a common disease caused by a parasitic organism which works into the intestines and multiplies very rapidly. Unlike bacillary white diarrhoea it does not attack the chickens until they are over three or four weeks old. Many species of animals and birds are subject to *coccidiosis*, but evidence seems to show that the parasite (*Coccidium*) of one species does not cause the disease in any other. The *Coccidium* found in the sparrow or rabbit is not transmissible to the domestic fowl. Large numbers of the organisms are evacuated with the droppings and healthy chicks are infected by coming into contact with food, water, or soil contaminated with these organisms. Chickens affected will appear listless, their feathers ruffled,

and their droppings may be stained with blood. If one of these chickens is killed and opened up it will be found that the cæca (the blind ends of the intestines) are enlarged, the contents looking like a cheesy mass and frequently streaked with blood. Normally the cæca are greyish and not so large. In any case preventive measures should be adopted in all outbreaks of *coccidiosis*. If at all possible, fresh rearing ground should be used each season, and droppings should be carefully cleared up and removed. Where intensive rearing is done on wire floors, trouble from this course does not often occur and if it does, can soon be checked.

A number of drugs are now on the market for the treatment of *coccidiosis*, of which sulphamezathine is still one of the best for the acute type in which much blood is often seen.

For the chronic type a drug known as Embazin is effective and is another of the so called "Sulpha" drugs.

These should be given in the drinking water at the first signs of trouble ; but never give for more than three days at a time. The best method is to give for three days, miss three days and give for two days.

As a preventative a drug called Nitrofurazone (which is in powder form) can be mixed with the food for chicks from about a week old to about 10 weeks, when the fear of *coccidiosis* is over. Where *coccidiosis* is known to occur the use of this drug in the food is very effective in preventing deaths from this trouble. (There are several brands of this drug put up for mixing with the mash and many firms sell a mash which includes it.)

Rickets occurs in chicks and growing stock, and can be recognized by a general weakness, a thickening of the joints, and anæmic appearance. It appears mainly in young stock that has been reared intensively. To avoid rickets, chicks should have good quality Cod Liver Oil in the mash, and two per cent. of a good mineral mixture. All the sunlight possible should be available, and to this

end, intensively reared chicks are often given access to a sun balcony.

Colds are common to all classes of stock, and are often due to faulty ventilation, overcrowding, or ranging through long wet grass. The trouble is recognizable by a discharge from the nostrils, and sneezing. This is not fowl pox, another trouble which is accompanied by an offensive odour. Birds suffering from a cold should be segregated at once and if dry-mash is used, it should be discontinued and replaced by a wet-mash. The drinking water should be "pinked" with a solution of permanganate of potash. Another remedy is 3 ounces of sulphate of copper, 1 ounce of sulphate of iron, and 1 quart of vinegar. The whole should be mixed together and 1 ounce of the mixture given in 1 gallon of drinking water. The medicine should not be put into metal vessels.

Contagious Coryza is often thought to be just an ordinary cold, but in two or three days the discharge from the nostrils becomes thick, causing the bird to breathe heavily. The spaces below the eyes become swollen and the eyelids may become glued together. Infected birds should be isolated at once, the eyelids being cleaned with cotton wool and the nostrils treated with vaseline.

The ventilation of the house should be looked to. Douglas mixture can be given in the drinking water and Cod Liver Oil from one or two per cent. added to the mash.

Bronchitis following a cold, and often followed by pneumonia, should be dealt with by killing off the affected bird, unless it is a very valuable one.

Tuberculosis, or "going light" as it is commonly called in poultry circles, is a contagious disease. Found more generally amongst adult birds, it is said to be contracted from food or water contaminated by the droppings of infected birds, which contain the causal agent. Birds suffering from this disease will readily be recognised from their anaemic or unthrifty appearance. It is useless to

treat the birds affected : they are better destroyed and burned. Where valuable birds are concerned, a veterinary surgeon should be consulted. If the house where infected birds have been running can be left empty for a month or two after disinfection, it is a good plan. Tuberculosis is encouraged by dirty, damp, and badly ventilated houses. The tuberculin test for identification of birds in the early stages of infection is essential for completely clearing a flock.

Peritonitis. Losses occasionally occur amongst birds in full lay from peritonitis. This is caused by the rupture of a developing yolk or a ruptured oviduct. Sometimes it is occasioned by the gut being perforated by some sharp substance.

Fowl Pox is a very contagious disease which attacks adult poultry stock. Other names for it are chicken pox, diphtheric roup, avian diphtheria and canker. It can be recognized by a discharge from the eyes, cheesy matter in the mouth, and wart-like growths on the comb and wattles. Where there is a bad outbreak of this disease very heavy mortality may occur. It is unwise to try and doctor infected birds, and they should be destroyed. A vaccine for the protection of fowls against fowl pox is now issued by the Ministry of Agriculture. It is claimed that this vaccine will keep the birds free from the disease for at least four months, and that many thousands of birds have been treated with satisfactory results. Birds subject to this treatment are not affected in their egg yield.

Fowl Paralysis (neuro-lymphomatosis) is said to have caused a great deal of mortality in the poultry yards in recent years. It is a disease affecting the nervous system, and invasion of almost any tissue by lymphocytes can occur, causing tumours of the ovary, spleen, liver, and other organs. Usually lameness or dropping of the wing is first noticed. This rapidly gets worse and the birds seem to lose the use of their legs. There is no cure for the

disease, which can only be diagnosed with absolute certainty after a microscopical examination. Paralytic symptoms similar to those seen in birds suffering from this disease are also found in birds affected with coccidiosis and intestinal worms, and may, in such case, be incorrectly attributed to fowl paralysis.

Blackhead, the bughear of turkey breeders, is a contagious disease affecting the liver and intestines, and usually attacking young birds under six months of age. Affected birds appear to be listless and lose their appetite. These symptoms are accompanied by loss of flesh, and yellowish diarrhoea. The comb and feet become dark. The parasite which causes the disease is said to be transmitted by caecal worms. Post mortem examination shows the liver with depressed areas of a greyish brown colour surrounded by a zone of inflammation.

Treatment is usually of a preventive nature. Immediately the disease is discovered, affected birds should be separated from the rest of the flock, the latter being moved to fresh ground. There are several preparations on the market for counteracting Blackhead. Injection of these preparations will give a bird a protection of short duration, extending not more than ten days. Repeated injections are required at that interval to prolong the effect. Birds which have already contracted the infection will possibly be saved if treated immediately. Turkeys and fowls should not be mixed. Hens or chicks can contaminate the ground.

Aspergillosis is most common in young chicks. When affected they will be found gasping and breathing heavily. Diarrhoea also occurs. There is no known cure for the disease, which is caused by the spores of a fungus found in stale or mouldy food, damp and musty litter. These should be avoided.

White Comb or Favus is due to fungus, and can be detected when white spots begin to appear on the comb and wattles. These increase and sometimes spread down

the neck. Any birds suffering from this disease should be isolated at once and affected parts treated with tincture of iodine. The house where the birds have been, should be disinfected and it is as well to remove and burn litter if it shows any signs of dampness.

Vent Gleet. This evil-smelling disease can be recognised by a sticky whitish discharge which oozes from the vent. This collects on the feathers round the vent which becomes red and inflamed. Affected birds should be separated from the rest of the flock. It is probably wise to kill and burn them, but if treatment is decided on, then the feathers should be cleansed with disinfectant and the vent syringed with a mild antiseptic daily. It is said that the trouble is usually brought on to a plant by a diseased cockerel which infects the hens it has been put with. This is another reason for carefully inspecting all stock purchased.

Though not diseases, the vices of *cannibalism*, *feather pecking* and *egg eating* may very well be discussed here.

Cannibalism can occur with adult stock as well as with young chickens. It is met with more frequently in birds reared intensively, than with those brought along on other systems. Overcrowding, lack of exercise, too much starch or too little protein and minerals in the food are contributory causes. Losses may be serious if the trouble is not checked. Cannibalism is not met with where birds are upon free range. When it is noticed that birds begin to look bare in patches, particularly round the tail, then watch must be kept for this trouble, and when found, treatment started at once. The cause, if known, should be remedied. The chickens affected should have the pecked parts treated with Stockholm tar.

Feather pecking is a vice similar to cannibalism and should be treated in the same way. The feather pecking may, however, be due to a feather mite and in that case the bird should be dusted with sodium flouride round the affected parts.

Egg eating, usually found with birds kept in confinement or small runs, can be a greater nuisance if not soon stamped out. The habit may arise from various causes; a lack of calcium in the shape of oyster shell or limestone grit, or thin-shelled eggs breaking in the nest, may start the trouble. Too few nests, or shortage of nesting material may be the cause of broken eggs. Probably the best thing to do when the culprit is caught is to wring its neck and have it for the table. Meanwhile put a few china eggs in the nests and remedy any shortage that may have occurred. Nests should always be in the darkest part of the house and kept well littered.

Many diseases can be controlled by proper attention, and being aware that trouble may arise from new birds or second-hand equipment brought on to the holding. Also that disease can be introduced through the eggs. A thorough inspection of all stock daily will save a deal of trouble. All birds should be regularly blood tested. Proper ventilation will prevent colds, and correct feeding prevent rickets.

CHAPTER XIII

SOME REPRESENTATIVE FARMS

A Pedigree Breeder's Farm, an Egg Farm, a Table Poultry Plant, a General Farm and a Small Holding.

THE day I visited the Accredited Breeding Farm of Mr. R. Johnstone at Woodchurch in Kent happened to be a Saturday. I expected to find him busy but had forgotten that on that particular day he allowed his men the afternoon off, and did all the work required to be done himself. Anyone who knows a Pedigree Breeding Farm will realise that it was a hard time to arrive, but Mr. Johnstone, with his usual courtesy, put himself at my disposal quite willingly.

ACCREDITED BREEDING FARM.

Mr. Johnstone has been established at the "Limes Poultry Farm," Woodchurch, for some 23 years. People familiar with the Weald of Kent, and Woodchurch, with its picturesque church and houses surrounding the village green, will also know what a pretty part of the country this is.

Before walking round the farm, Mr. Johnstone took me into his office. "This is where a good deal of my work has to be done," he said. "I need good men to work for me as I am sometimes tied in here all day. At times as many as 30 letters will arrive by the morning's post, all of which must be answered by myself. It does not mean simply sitting down and writing a reply straight away.

Most of the letters will contain orders, or enquiries. Records will have to be looked up, pedigrees looked over, and order books gone through to make sure an order can be filled on a certain date, perhaps some months ahead." It was fairly evident from what I saw that the office side of a pedigree poultry farmer's business was a formidable affair, and called for the expenditure of a lot of time.

Whilst there have been pedigree poultry farmers in the industry for many years, it is only in recent times that we have had Accredited farms. These are, in brief, farms sponsored by the Ministry of Agriculture. After careful inspection the farms receive the official approval of the Ministry, and are registered as holdings where hatching eggs, day old chicks, or growing and adult stock, can be purchased, with the assurance that the best can be obtained there. It will be realized that a farm does not receive accreditation unless the stock is of a high order. Into this class of farm comes the Limes Poultry Farm, which is some 18 acres in extent, and all of it is grass. A fine sward—Mr. Johnstone informed me that he did no mowing at all, as he ran a flock of sheep to keep the grass down for him.

The breeds of poultry kept are Light Sussex, Rhode Island Reds and Brown Leghorns. Pure-bred stock is got

from these breeds, but Brown Leghorn
THE BREEDS. cocks are mated to Light Sussex

pullets and Rhode Island Red pullets to produce a cross which Mr. Johnstone says is very popular to-day. In normal times Mr. Johnstone runs 2,000 stock birds, all of which are trap-nested and recorded in their pullet year, as his business demands. The farm carries two Cabinet Incubators of a capacity of 12,000 eggs. Mr. Johnstone has run these for some years, and he is so satisfied with them that nothing would induce him to change to other types. The total brooder capacity is 4,500. The large brooder house was well filled on my visit to the farm,

and I was able to see a fine collection of virile youngsters of different ages. The house was divided into sections well boarded up to prevent draughts, and a sun balcony was attached to allow the chicks to get out into the air. Heat was obtained from the pyramid type of oil brooder. Mr. Johnstone informed me that only cross-bred chicks were brooded intensively, the pure-bred stock being brooded out of doors in small unit brooders, and foster mothers, about 150 capacity, and from these chicks go out on to the grass when a few days old. After the brooder stage the chicks go out on range into paddocks kept closely grazed by sheep. These paddocks are only used for poultry during the rearing season. Here the birds are accommodated in Sussex night arks and small unit houses. It was interesting to note that there were no wired runs in these paddocks, the chicks being allowed to range at will. Mr. Johnstone told me that he had no trouble whatever from birds crowding at night into a few arks. He thought he avoided this by keeping the birds confined to the arks for the first week, or ten days, and towards the end of that time letting them out in the evening and giving them their last feed just in front of the ark. As might be expected from a farm of this description, one does not see large laying houses scattered round the fields, since the whole business is devoted to the sale of hatching eggs and stock. So the housing is of the small unit breeding pen type, well spaced out, with adequate wire runs attached. Some 30,000 chicks are as a rule hatched out each season.

Both the wet- and dry-mash systems of feeding are practised at "The Limes." With all the trapnesting that has to be undertaken on a farm of this description it is not surprising that a fairly large, and certainly a competent staff must be employed. In addition to

COMPETENT
STAFF.

Mr. Johnstone himself, who is very actively engaged in the work, there is also a foreman, who does the incubation and

rearing, a second man who does the trapnesting and looks after the stock, and a third man who fills in with the routine work as, and when, required.

I notice on the mating list that Mr. Johnstone has sent out for the present season, that he supplies day-old chicks to order only, that all breeding stock is drastically culled, and only birds of good type, health, and eye colour, are included in the breeding pens, that birds are regularly sent to the Laying Tests, where many honours have been won, and that all stock is regularly blood tested.

To give an illustration of the work entailed on a Pedigree Poultry Farmer's plant I quote further from Mr. Johnstone's mating list. "Special Pen A.1 contains 2-, 3-, 4-year old hens of good size, eye colour and plumage, with the following records :—

| | | | | | | |
|------------------|-----|-----|-----|-----|-----|-----|
| Ring Nos. | 965 | 229 | 971 | 208 | 203 | 266 |
| 48 weeks' record | 225 | 230 | 211 | 208 | 208 | 207 |
| Ring Nos. | 406 | 401 | 325 | 415 | 373 | 376 |
| 48 weeks' record | 206 | 205 | 204 | 201 | 197 | 194 |

Mated to a well-marked cockerel, with blood-red eyes, direct from H. D. Barley, from a tested dam, her record—206 specials, 38 first—244 eggs in 44 weeks. Sire's dam record 44 weeks—91 specials, 143 first and second—236 eggs. All eggs from this pen 2½ ozs. and over and marked with bird's number."

This extract gives some idea of the enormous amount of work entailed, and detail to be undertaken, in order to have available the information a prospective buyer will probably require. To attain proficiency in this branch of the poultry industry requires years of steady building up, and fortunate the poultryman who now has such officially recognised reliable establishments from which to purchase. It is his own fault if he does not take advantage of the opportunity offered to him.

AN EGG FARM

Sherfield Egg Farm was as near the ideal holding, to my way of thinking, that I have ever come across. I had certainly seen its like on the cover of magazines advocating a "Back to the land" policy, but I had never hoped to run across it in the rough and tumble of every day life. It possessed nearly all the amenities one looked for but seldom found. About 30 acres in extent, the farm was close to a village but not of the village. It was so secluded and shut off that it might have been a hundred miles away from another habitation. A good hard road ran down to it from the local railway station, which was about half-a-mile away. A frequent service of buses to neighbouring towns was close by.

When I paid my visit to the farm, the first thing that struck me was its neat lay-out. Sherfield Farm was evidently not meant for a poultry farm in the first instance. Adjacent to the farm-house were two ranges of buildings substantially built of brick, and in excellent condition. One small building had been converted into an incubator room, and from the hatching records I was shown I should think it was admirable for the purpose to which it had been turned. A cow shed was fitted up with a range of fattening coops, an open cart shed was used to store the poultry manure. There were two good granaries, one over the other, for storing the feeding stuffs. Other buildings served the purpose of egg packing room, oil store, coal store and plucking shed. Mr. Sheaf, the tenant, must have saved the expenditure of a deal of capital when he found these buildings to hand, and requiring practically no expense on conversion. He informed me that he took the place over after it had been used as a general holding, and that it had never before been run as a poultry farm.

The place was well fenced, with one or two pieces of woodland to add to its attraction, and—an undoubted blessing—main water was laid on to the farm and even the fields.

As its name implies, I found that Sherfield Egg Farm was run for the production of eggs for the table. At least that was its main object. True, a few dozen eggs were sold for hatching and some day-old chicks disposed of locally, but no attempt was made to advertise or push this trade. Neither were any ducks, geese or turkeys kept on the farm. The only breed I found was the Light Sussex for the breeding pens, and that these were crossed with Rhode Island Red cockerels to produce a sex-linked pullet for the laying houses. Mr. Sheaf informed me that he had for some years kept pure White Leghorns and White Wyandottes. Whilst he was satisfied with the egg yield from these two breeds, and whilst the Wyandotte cockerels made a good price on the market for table, he did not regret the change. The cross was giving him a good egg supply, and he had no difficulty in getting rid of all the cockerels he did not want, at day old, or eight weeks old in some cases, to a neighbouring Table Poultry Plant. He had found the disposal of the White Leghorn cockerels quite a problem and on some occasions had no option but to kill them off as soon as he could distinguish them from the pullets. Now he kept back just what cockerels he thought he would require, to do a little table work after his incubation was finished, and so provide some birds for his own household, and some for marketing also.

The total head of laying stock was about 1,500. These were housed in semi-intensive houses of good construction, each taking about 250 birds. The houses were well spaced over the grass-land and were provided with runs of

PRODUCTION OF EGGS.

THE HOUSES.

ample dimensions, both in front and back. I asked Mr. Sheaf whether he was satisfied with units of 250 ; that I thought units of 150 were better and probably safer from a health point of view, but he assured me that he had not experienced any trouble in working on a larger unit. The houses were well broken up into sections, and on my visit I found everything scrupulously clean. As large as the runs were, I found them well worn round the outlets from the house. I was told the ground immediately in front of the houses was regularly swept, the droppings being carted away, and that the top spit of earth was removed and replaced by clean earth every year.

Feeding was done on the dry-mash system which the birds had *ad lib.* A corn feed was given at night in troughs, the birds being given as much as they would clear up in half an hour. In

FEEDING. addition a light corn feed was given in the litter in the house the first thing in the morning. Mr. Sheaf said he considered this scratch feed first thing started the birds exercising and was very beneficial to them. Each of the houses was fitted with corn and mash bins in an annexe at the end. The bins were large enough to take a week's supply of both corn and mash, so one mixing and one delivery per week was all that was required in the way of feeding. The fact that there was a tap adjacent to each house was a boon, especially in the hot days of summer.

There were about a dozen breeding pens wired with alternate runs, each pen holding 10 hens and one male bird.

The incubator room contained several hot-water and hot-air machines, of capacity varying from 150 to 360 eggs. Mr. Sheaf told me that whilst he considered he did as well with hot-air as with hot-water machines, he was of the opinion that on an average he got better results from the 150 than the larger size incubators.

The brooder house was a long, permanent structure

divided into sections and heated with hot-water pipes which ran along the whole length of the building. The house seemed well ventilated, and the windows could be removed if necessary. Outlets from each section led in to wired runs, the chicks having access to the ground. Attempts were made to keep these runs grazed down, but they must obviously very soon become the worse for wear. Mr. Sheaf gave me the impression that he would be glad if his rearing results were better than they were, and I suggested that this might be met by fixing up a sun balcony for the chicks with a wire floor, instead of letting them onto the ground. It seemed to me that the latter must become foul despite all the trouble that was taken to cleanse it.

From the brooder house, the chicks, after being cooled off, went straight out to their rearing ground, and were allowed to range. They were accommodated in the ordinary Sussex night arks, and these were so well spaced in

REARING GROUND.

three or four acres of meadow, that it was not found necessary to wire the birds in. A temporary wire fence was put round each ark when the birds were first put out, but that was removed after a few days, and Mr. Sheaf told me he had no difficulty with the birds crowding into the wrong arks at night. Dry mash was fed in hoppers attached to each ark, and water was kept close at hand in each case. Being in a hunting county Mr. Sheaf found it wise to close up all his stock at night. The farm had two of these rearing paddocks each used in alternate years. When not in use Mr. Sheaf had no difficulty in letting off the grass-land to a neighbouring farmer. The chicks remain on range until the time comes for them to go into their laying quarters.

In a smaller paddock cockerels are run by themselves. These are also housed in arks until the time comes for

fattening them. They are then brought in to the fattening cages where they are trough fed on the orthodox mixture of PADDOCK. Sussex Ground Oats and skim milk for two or three weeks, the time depending on the readiness of the birds to consume their food. Killing and plucking by hand is done on the farm and the birds are sent away by train, about thirty at a time packed in the Sussex Ped, to the wholesale markets in London.

All eggs are marketed through a Packing Station.

I asked Mr. Sheaf whether he had ever considered doing a retail trade in eggs and poultry, but he said he did not think the trouble involved was worth it, and that he much preferred the wholesale markets.

Mr. Sheaf, I gathered, did the whole of the work himself. Certainly he did not employ any outside labour. It did seem to me, however, that members of his household took a lively interest in the poultry, and I formed the impression that he was able to call on help from them when the necessity arose.

Certainly this was a well-run little farm. The fact that it was so well provided with buildings which were included in the rent, helped materially when initial outlay had to be considered. The acreage of the farm was ample and enabled certain areas to be rested when occasion demanded.

A TABLE POULTRY PLANT

The Table Poultry producing farm of Mr. Smith was a compact little holding with no large fields to tramp over.

Nevertheless it was a hive of industry. Somehow this kind of establishment suggests factory lines more than any other sort of poultry holding. It was, however, typical of the successful Table farm. The first thing that impressed one was the absence of breeding pens and large laying houses. In one fairly large paddock were Sussex night-

arks, most of them in use for growing chicks; a sun-halcyon running the whole length of what was undoubtedly a brooder house was fairly full of birds ranging from one week to six weeks old; a large open shed was full to capacity with crated birds, and in an adjoining building plucking was nearly finished at the end of what had obviously been a very busy morning. Such is a bird's eye view of the present day Table Plant.

Though having plenty to do, Mr. Smith courteously gave me of his experience and time to talk about this particular class of work. I was surprised to hear that he was able to get all the day-old chicks he required during the year from Hatcheries and

REGULAR INTAKE.

Breeding Establishments. I know of course there would be no difficulty in the spring months, but he assured me they were forthcoming at other seasons. For the greater part of the year he was able to get cockerel chickens, at other times when, perhaps, incubation had to be done specially for him, he had to take pullet chickens as well. The whole success of the place depended upon a regular intake of day-olds each week and a corresponding output of chickens to market, also each week. This went on for ten months of the year. The remaining two months were devoted to a thorough clean-up of the plant, housing, utensils and appliances, and time for a break for the staff. It will readily be appreciated that being able to purchase reliable day-olds does materially affect the working of such a holding, breeding pens and incubation being dispensed with, and attention simply concentrated on the rearing, fattening and marketing of the birds.

I gathered that Mr. Smith himself had retired from work in the city and that he had started his farm for the benefit of an only son. Mr. Smith certainly took an active interest in the place and with his boy, a lad of about 18, took charge of all the rearing. The fattening side of the business he—

wisely I think—left in the hands of an experienced fattener. He told me he had a very great difficulty in getting a good mao to satisfy him in the class of work turned out, but he thought he had at last succeeded. When I subsequently inspected the birds being packed for market, I think I agreed with him.

The whole of the work on this holding revolved around the intention to market 55 birds a day, 4 days a week, for 10 months of the year. This meant an

MARKETING. output of some 9,460 fully-fattened 4 to 4½ lb. birds in the 10 months.

Marketing was only done by Mr. Smith on 4 days a week, because, according to him, the best prices were not got on a Saturday market, and also it allowed Friday and Saturday for cleaning up. Neither was any killing done on Sundays for the Monday market. Since 220 birds were marketed each week, an intake of 250 day-olds was needed weekly, and this number allowed for a loss in rearing and unthrifty chicks of 12 per cent. All day olds purchased carried a guarantee that the parent stock had passed the agglutination test for B.W.D. and had a clean bill of health.

When they arrived, day-olds were housed in a large brooder house, where they remained for from 6 to 8 weeks, according to the weather, having access to a sun balcony from the first. Heat was obtained from oil-burning heaters. Dry-mash and a little grain was the system followed for feeding.

Just before leaving the brooder the chicks were culled, any unthrifty birds being destroyed. Mr. Smith said this saved a lot of disappointment and worry in the long run. He was very much against carrying what he called "passengers."

The flocks I found were enclosed in good size runs, contrary to the practice on most places, but Mr. Smith felt quite satisfied with the plan, saying he did not find

unrestricted range an unmixed blessing. Here also chicks were fed on dry-mash and grain.

At 14 weeks, exactly, hirs came off grass to the fattening coops. Mr. Smith was very particular about this. They had to come away to the day, and none were allowed to remain on the score that they would benefit by another week on grass. He had tried the latter practice he said, in the early days, only to find himself eventually with a crowd of chicks encumbering the arks, of all ages, and of questionable utility.

Fattening coops were housed in open sheds, the latter provided with shutters which could be closed after feeding, putting the birds into semi-darkness, and inducing rest.

Here I was introduced to the fattener, a typical Sussex feeder, who, I was quick to see, knew his work. He informed me that he kept the birds on the trough for about a fortnight and then crammed for the next seven days.

FEEDING. The feeding was on the usual lines, advocated in this book, viz., Sussex Ground Oats and milk for both trough and cramming, except that in the latter case mutton fat was added to the mixture. Here again I found no passengers were allowed, the whole of a particular hatch of the same age having to go to market the same week. The fattener, in addition to feeding his hirs, prepares the fattening mixture, keeps his shed cleaned out, does the plucking (by machine in this case) and does the packing for market. The only help he gets is from a couple of women who come up on market days for which they are paid piece-work rates.

The finished hird on Mr. Smith's farm is 17 weeks old and I should say the average dead weight (i.e., minus feathers) is $4\frac{1}{2}$ lb. A good many of the hirs scale 5 lb., but when pullets are used the weight is nearer 4 than 5 lb.

I was interested to see on this establishment hirs being

marketed in the non-returnable packages in dozen and half-dozen boxes. Any odd birds left over were sold locally without any trouble. These birds were beautifully finished and packed in a first-class manner. They all went to the wholesale market, and I felt they could, and would, hold their own with any consignments that might be coming in from abroad.

THE POULTRY DEPARTMENT OF A GENERAL FARM

It was with some hesitation that I rang up Mr. J. H. Berry of Crundale House Farm to enquire whether I might have the opportunity of looking over his poultry department. I knew that he was a very busy man, for he was engaged not only in working two large farms, but was also actively interested in various public affairs. Mr. Berry was, however, not only willing that I should see his poultry, but offered to accompany me round his farm, an offer of which I was glad to take full advantage. Crundale House Farm I found, comprised some 250 acres, of which 140 are arable, 20 acres fruit, 15 acres pasture, and 75 acres downland. The farm is situated in a dip of the North Downs and is about 200 feet above sea level.

I soon found that Mr. Berry, whilst professing to be no poultryman, was keenly interested in the poultry department, running it on up-to-date lines as a separate department, and requiring it to pay its way. Particularly emphatic I found him on the subject of keeping only the best, and to that end, he insisted on regular culling. At the end of the season, he went further, and called in a professional culler, for a final culling of the flock, with instructions to discard anything not of first-class quality. That being the policy, one would not be surprised to hear that I was able to see a first rate lot of birds. When we started out on our round Mr. Berry laughingly suggested I should keep my eyes skinned for dud birds, offering to put a

UP-TO-DATE
LINES.

contribution into the Red Cross Box for every questionable bird I could point out to him. I must confess that at the end of the afternoon I was not able to find the box any heavier as a result of the challenge.

The stock on the farm consists of Rhode Island Reds, and a beautiful lot of birds they were. The present head of stock is approximately 1,000. Incidentally, Mr. Berry says he may increase this to 2,000 but he will not go beyond that number. Of the number kept, about 200 are breeding hens which are kept pure. It was with legitimate pride that I was shown the Rhode Island Red cockerels bought in for the coming season's activities. Mr. Berry told me a friend, in whose judgment he had every confidence, bought these birds for him and that he had paid £5 for each of them.

They were a nice bunch. Breeding is done on the flock mating system, one bird to some twenty hens. An extra bird is included at the commencement of the breeding season to allow for the hens remaining properly mated, if one falls out on the way. One feature I found at Crundale House Farm was of particular interest. Of about 800 pullets reared for egg production, some 600 are mated in their first season to Black Leghorn Cockerels, the eggs being sold for hatching. Mr. Berry pointed out that chicks hatched from this mating were not pures, and would not ultimately find their way into breeding pens, but would be used simply for egg production. I was informed that a ready sale was found for all eggs that came from this cross mating.

At present no incubation is done on the farm, all eggs being sent away for hatching. The day-olds are sexed and only pullet chicks returned for rearing, with the exception of a few cockerels which are included for rearing table-chicks for the house. The pullet chicks are intensively reared in a brooder house divided into six sections, each taking 100 chicks. The chicks are brooded under an

oil-burning pyramid hover. Each section of the brooder house is effectively boarded off to prevent floor draughts. A sun parlour to allow the chicks to get into the fresh air and sun, is built on to the front of the house.

From this brooder house chicks are transferred to arks, placed as a rule in the orchards. I asked Mr. Berry whether

be had ever had any trouble with his birds as the result of eating fallen fruit.

He replied in the negative. The bousing is on what may be termed the small-unit

IN THE
ORCHARDS.

system. There are a few permanent houses on the pasture land, and these take up to 150 birds each. I noticed in these particular houses that the perches were placed at right angles to the back of the house. Underneath the dropping boards were nest boxes.

Slatted-floor houses were used in the orchards. A portable type of house was in use for taking the birds onto the stubble in the Autumn. Mr. Berry was very keen about this and said the whole of his stock was so transferred, the birds having to find all their food there as long as there were any gleanings to be had.

I was told that the whole of the stock was shut up at night, however far the birds might be from the farm buildings.

Mr. Berry informed me that blood testing was done regularly, every year.

Whilst the chicks were being brooded, the dry-mash system of feeding was used, but as soon as the growing stock went out onto range, it—together with the adult birds—was fed on one wet-mash and one grain feed per day. I was interested, in view of experimental work in which I had been engaged, to find that the wet-mash had a good quantity of steamed potatoes in it. Mr. Berry informed me that the use of potatoes as an important part of the mash had been fully justified by the results he had obtained.

One man was responsible for the whole of the poultry work, which, in addition to that already mentioned,

ONE MAN
RESPONSIBLE.

includes rearing a few ducks and geese for the table. As is usually the case on the general farm, relief can be found when he is requiring a day off. Help is also forthcoming if houses have to be moved from one part of the farm to another, or anything should arise to demand assistance.

I left Crundale House Farm feeling what an advantage this system of poultry-keeping had over other methods. Plenty of sweet ground is available for birds, and they live under ideal conditions. As birds are on free range no wiring is necessary. The exercise the birds are able to obtain must make for good virile stock.

A SMALL HOLDING.

Mrs. Shan's small holding stands up among the hills about 500 feet above sea level. It is one of the prettiest, unspoiled parts of the country I know.

UP AMONG
THE HILLS.

On a clear day one can see the estuary, and when the wind is in the right direction, one can taste the salt breezes coming up from the sea. I say Mrs. Shan's holding, because Mr. Shan's work takes him away from home for the greater part of the day.

When I arrived one sunny morning, Mrs. Shan was busy making chutney. "I was hoping to call when you were not busy," I remarked. "Then you must come in the middle of the night!" she replied.

Woodlands Farm, as this little holding is called, comprises house, buildings, a good garden with some fruit trees and about ten acres of pasture.

A couple of cows and a heifer are kept; also when the opportunity arises, one or two bull calves, or a heifer calf, are brought along for market. The care of the cattle and growing stock are the province of Mr. Shan who also does the milking, before going off to his own work.

Several weaner pigs are bought in during the year and fattened, and it was with not a little pride that Mrs. Shan told me "They are killed, dressed, and smoked on the premises," and she held up for exhibition a nice piece of smoked bacon.

A few rabbits are bred and fattened for the table. Aylesbury ducks are hatched for the same purpose, and about a dozen turkeys are brought along for the Christmas market.

To inspect the poultry section was the main object of my visit to Woodlands Farm.

Mrs. Shan told me that she always tried to keep an average of 120 layers. I noticed that these were of the Plymouth Rock breed, and a very fine looking lot of birds they were. Housed in the ordinary type of small roosting house, fitted with nest boxes, there were about sixty in each house. They had the run of a five-acre meadow, where the cattle also grazed. Asked why she had chosen this particular breed, Mrs. Shan said she considered she got a good supply of nice eggs from them, they were very hardy, and also the cockerels made good table birds which she found no difficulty in selling. A corn feed which was

MANAGEMENT. broadcast in the grass was given to the birds when first let out. In the late

afternoon a wet-mash made up of boiled wheat and a little maize is mixed with skim milk, being dried off with middlings. This is varied with a mash made up of potatoes and Sussex Ground Oats rubbed off with middlings. Skim milk is also added to the mash. About 150 chicks are reared annually by broody hens, which also hatch out the eggs. The hen is confined to the coop for a short while after hatching, but later she is let out to roam and forage with her youngsters. Mrs. Shan does not think it extraordinary to rear all the chicks hatched out; on the other hand she is perturbed if the losses amount to more than one or two. If possible all hatching is done in the month of March. Wet-mash consisting of

Sussex Ground Oats and middlings mixed with skim milk is fed to these young chicks. Cracked wheat is also given as a corn feed.

Birds for the table and the Aylesbury ducks are given a mixture of boiled wheat and cracked maize to which skim milk is added, the whole being dried off with middlings.

Woodlands Farm being about seven miles from a town, it will be seen what a boon the Packing Station is in this case, for the van calls to collect the eggs every week, when, from what I saw, Mrs. Shan has a large box full for it.

A paddock of about three acres was, I noticed, put up for hay and a stack in which big inroads had already taken place stood in the farmyard. I was informed that no hay had been purchased for the stock for many years. "We really are busy in hay making time," Mrs. Shan observed. As one would expect, the pigs were being fattened in their sties, and the same care was taken in the preparation of their meals as was given to those got ready for the birds.

Before leaving Woodlands I was given a cup of tea, and sampled one of the Plymouth Rock eggs. The yolk was as rich as anyone could desire. On enquiry I found that the butter was home-made.

"How do you manage about shopping," I asked Mrs. Shan, "Well," she replied. "The grocer calls here about once a fortnight, and the baker a bit more frequently, but we see to it that we do not go short." "How long is your working day?" I ventured. "From daylight to dark," she replied. "And after that I clean the eggs." "Would you change the life if given the opportunity?" I queried. "Not for one minute," she protested. "I would not change it for anything. There is plenty to do I admit, but getting up, and going out in all weathers wet or fine, to see the stock, will keep anyone healthy, and you will have no need of the chemist's shop."

I came away from Woodlands having seen much to think about. The night before, I had listened to a debate on the

wireless which I thought suggested there should be no place in the future, for the small farm. Here was someone willing to work very hard, not wanting supervision or interference, knowing the work, and only wishing to be allowed to get a fair living for her exertions.

STAKE IN THE
COUNTRY.

We have heard in the past, and may do again, of bringing the Townsman to the land, and helping him to establish himself. Could not some help be extended to those already there, and who wish to remain? Could they not be given a stake in the country? In the past a good deal of our dairy-produce and eggs came from the continent, from the land of peasant proprietorship. Is it beyond the bounds of possibility to establish something of the same sort in this country?

CHAPTER XIV

RECORDS.

Keeping Records. The necessity for working to a system. Recording details of hatching, rearing, marketing and casualties. Some notes on keeping accounts.

THE keeping of records is usually associated with the pedigree breeder who must know the life history of the birds on his holding, and the commercial man may well ask to be saved from adding it to his other multifarious duties. Far from adding to these duties however, it can be made the means of saving a lot of work and worry. A man may think he knows his holding in and out, just what numbers he has at one time, how many casualties he has sustained, say during the previous three months. It is suggested that without keeping some records, he may well find himself wide of the mark. Especially where table poultry are concerned, and hatching, rearing, fattening and marketing are carried on regularly week by week for perhaps ten months of the year, or even without a break, some check up is necessary. These birds will range from day old to about 18 weeks, and it is very easy for stock on a large holding of this description to have disappeared for some little time, before being discovered, if the loss is found out at all.

The writer, who has been concerned with table poultry for many years, devised what he considers a simple plan, to enable him to keep his finger on all the stock. By its use he was enabled to know just what he would be doing in

SIMPLE PLAN.

any one week in the year, and could see his work for months ahead. The routine work such as cleaning out can be so arranged that it will not clash with a killing and marketing day. Care can be taken that no hatching takes place, or any shifting of chicks, has to be done on a Saturday, Sunday or Bank Holiday. The farmer can know just how many birds he will be marketing on any particular day, some time ahead; he will know the exact age of the batch to be sold, and if he is wise he will let the whole batch go and not carry over any passengers till they have grown a little more; these birds which are probably nothrifty, have a habit of being left too long for their own good, or the farmer's pocket, and they are better sold.

It is suggested that the plan set out below is capable with adjustment to suit any type of poultry farm. The Ground Plan would be better drawn out or painted on a sheet of plywood or some such material as it will have to be used constantly for pinning up tickets of identification in the appropriate squares.

Fig. 34 shows the rough plan of a simple Table Poultry holding, where no Breeding Stock is kept and hatching eggs are purchased regularly week by week. Two hundred eggs are purchased each week, a 65 per cent. hatch is allowed for, and an outside figure of 20 per cent. loss from deaths and culls in rearing estimated for the whole year. It will not of course always be as much as this.

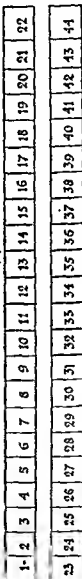
Casualty Sheet (D) (to hang up near the Ground Plan of the Plot).

| | | | |
|----------|------|---|----------|
| January | 4th | 1 | (B.H.1.) |
| " | 6th | 3 | (B.H.1.) |
| February | 9th | 2 | (B.H.2.) |
| " | 13th | 1 | (B.H.1.) |
| " | 16th | 2 | (B.H.3.) |
| " | 16th | 1 | (B.H.4.) |
| " | 17th | 1 | (C.O.1.) |
| " | 20th | 1 | (C.O.1.) |

DIAGRAMMATIC PLAN INTENSIVE BROODER HOUSE (A)



FATTENING SHED (C)



FEF.

Fig. 34.—Working to a plan is as necessary on a poultry holding as in any other business.

| | | | |
|-------|-----|---|-----------------------|
| March | 7th | 1 | (A.1.) |
| " | 8th | 1 | (A.2.) etc., etc. |
| | | | B.H.=Brooder House |
| | | | C.O.=Carry-on Section |
| | | | A=Arks |
| | | | F=Fattening Shed |

Work Sheets (E) (assuming operations to start in January).

(1)

| | | | | |
|---------|------|-------|---------|----------|
| January | 4th | Tues. | Batch 1 | day olds |
| " | 11th | " | " | 2 " " |
| " | 18th | " | " | 3 " " |
| " | 25th | " | " | 4 " " |

(2)

| | | | | |
|----------|------|-------|---------|----------------------|
| February | 1st | Tues. | Batch 5 | day olds |
| | | " | " | 1 to carry on rearer |
| " | 8th | " | " | 6 day olds |
| | | " | " | 2 carry on |
| " | 15th | " | " | 7 day olds |
| | | " | " | 3 carry on |
| " | 22nd | " | " | 8 day olds |
| | | " | " | 4 carry on |
| " | 29th | " | " | 9 day olds |
| | | " | " | 5 carry on |
| | | " | " | 1 to arks |

(3)

| | | | | |
|-------|------|-------|----------|---------------|
| March | 7th | Tues. | Batch 10 | day olds |
| | | " | " | 6 to carry on |
| | | " | " | 2 to arks |
| " | 14th | " | " | 11 day olds |
| | | " | " | 7 to carry on |
| | | " | " | 3 to arks |

RECORDS

| | | | | |
|-------|------|-------|-------|---------------|
| March | 21st | Tues. | Batch | 12 day olds |
| | | " | " | 8 to carry on |
| | | " | " | 4 to arks |
| " | 28th | " | " | 13 day olds |
| | | " | " | 9 to carry on |
| | | " | " | 5 to arks |

(4)

| | | | | |
|-------|------|-------|-------|------------------------|
| April | 4th | Tues. | Batch | 14 day olds |
| | | " | " | 10 carry on |
| | | " | " | 6 to arks |
| " | 11th | " | " | 15 day olds |
| | | " | " | 11 to carry on |
| | | " | " | 7 to arks |
| " | 18th | " | " | 16 day olds |
| | | " | " | 12 to carry on |
| | | " | " | 8 to arks |
| " | 25th | " | " | 17 day olds |
| | | " | " | 13 to carry on |
| | | " | " | 9 to arks |
| | | " | " | 1 to fattening shed |

(5)

| | | | | |
|-----|------|-------|-------|---------------------|
| May | 2nd | Tues. | Batch | 18 day olds |
| | | " | " | 14 to carry on |
| | | " | " | 10 to arks |
| | | " | " | 2 to fattening shed |
| " | 9th | " | " | 19 day olds |
| | | " | " | 15 to carry on |
| | | " | " | 11 to arks |
| | | " | " | 3 to fattening shed |
| " | 16th | " | " | 20 day olds |
| | | " | " | 16 to carry on |
| | | " | " | 12 to arks |
| | | " | " | 4 to fattening shed |
| | | " | " | 1 kill and market |

| | | | | |
|-----|------|-------|-------|---------------------|
| May | 23rd | Tues. | Batch | 21 day olds |
| | | " | " | 17 to carry on |
| | | " | " | 13 to arks |
| | | " | " | 5 to fattening shed |
| | | " | " | 2 kill and market |
| " | 30th | " | " | 22 day olds |
| | | " | " | 18 to carry on |
| | | " | " | 14 to arks |
| | | " | " | 6 to fattening shed |
| | | " | " | 3 kill and market |

These working sheets should explain themselves, and they deal with three complete batches from day-old stage to killing. It will be noticed that Tuesday is the day in each week on which all work, i.e., moving birds from one section to another, and killing, is stated to take place. It is obvious that it cannot all be done in one day and the work sheet is merely a guide or reminder that in that particular week, all the work set out must be commenced on Tuesday and carried on until completed. Monday is left free for cleaning up after the week-end.

It will also be noticed in the work sheets that the birds are killed after three weeks fattening when 19 weeks old. This is subject to adjustment and can be carried out after two weeks conditioning, if it is considered the birds are ripe for marketing.

From the work sheets the ground plan is made up every time birds are moved. Take the date May 2nd for instance. The 18th batch of day-olds has come in and will go into the brooder house and into brooders 7 and 8. A small ticket marked (B.18, May 2nd, 70) will be pinned on to square 7, and a similar one on to square 8. It is best to leave the number 70 in pencil. The ticket for batch 14 will be removed from numbers 9 and 10 brooders and put in to

squares 5 and 10 in the carry on. Likewise, for batch 10 the tickets will be removed from carry-on to arks and those for batch 2 from arks to fattening sheds. At each stage tickets will be adjusted for numbers from Casualty Sheet D.

It is hoped this plan does not look formidable. It is really very simple, and the writer has found boys able to keep it accurately. It is a system that

SIMPLE SYSTEM.

has saved any amount of worry and trouble, which one is very liable to run into where thousands of small birds are scattered round a holding. It is so very easy to lose birds without some check. Working on this plan it is of course necessary that all brooders, carry on rearers, arks and fattening cages shall be plainly numbered. Paint should be used or metal numbers, as chalk is easily obliterated.

Every poultry farmer should keep a set of books in which are recorded all his transactions during the year. Not only

TRANSACTIONS.

is it business-like to do so, but well-kept accounts can be the means of being able to place one's finger on the weak and unprofitable spots and getting them altered before it is too late. Nor need there be any difficulty in the matter, for it can be done in a very simple way. Nothing elaborate is needed. For those who know nothing about book-keeping there is A. C. Campbell's "Good Farm Accounting," in this series of books. There is set out, in sufficient detail, all that the good poultry farmer is likely to need in keeping his accounts.

It is usual for books to be kept for a complete period of 12 months. Just when one should start depends on the circumstances. If a new holding is being taken over, then accounts should start at the same time. Should one have been poultry farming for some time and kept no books, then a start can be made on, say, January 1st, or some people would prefer Michaelmas Day.

Briefly what one would want to ascertain is the profit

made in the year, if any. Now profit does not mean just cash, but also includes any increase in stock there may be at the end of the year. The farmer will also want to know how much he has paid out for feeding stuffs, wages if any, purchase of stock and so on. In addition there will have to be a record kept to ascertain if he is owed more or less at the end of the year than at the beginning, likewise whether he himself owes more or less than he did a year previously.

Therefore at the beginning of a tenancy, or when commencing to keep a set of accounts, an inventory and valuation of everything on the holding, which belongs to the poultry farmer, should be made. This will include

INVENTORY AND VALUATION.

birds, implements, appliances, housing (if owned by the poultry farmer), any eggs in stock, and also any feeding stuffs and other useful goods in hand. These should all be priced at what they cost, with the eggs at market value. At the same time should be made out a list of debts connected with the farm owing by the farmer, and a list of farm debts owing to him.

During the year a cash book should be kept in which are recorded all farm receipts and payments. It must not contain any private transactions.

At the end of the year another inventory will have to be made, similar to the first one, but with this difference. Any increase in live stock which has been bred on the farm should not be included at market value, but rather at a fair value. By this is meant a value which will not be affected to any extent by a rapid fluctuation in prices. The reason for this is obvious. Should prices for some reason have soared highly during the year, then a good profit will be shown, but it will only be a paper one, for the stock will most probably be kept on for another year, or at least a good proportion of it. If the market value is taken and prices fall in the following year, then a loss will be shown, which again will be a paper one. Far better keep a fair price

fixed and use the same figure each year. Matters will adjust themselves when stock is sold at market value, and any profit shown will at least be a real one.

Also in this valuation at the end of a year's working, implements and appliances will have been used for a year. If they were purchased new, and only used a very little, they will still be second-hand. They too are most probably going to be kept on the holding, and a fair way to deal with them is to depreciate them to the extent of say 10 per cent. at the end of each working year. Perhaps some things will be better depreciated at a little higher figure, and on the other hand some a little less. Whatever figure is decided upon should be used each year.

In addition to the inventory and valuation of the farm at the end of the year, a list will have to be prepared showing

| | |
|-------------|---|
| FARM DEBTS. | farm debts owing by the farmer, likewise a list of farm debts owing to him. |
|-------------|---|

Now the difference between the valuation at the end of the year and that taken at the commencement of the year will show part of the profit on the farm, providing the second valuation is higher than the first. The profit will also be affected by the difference between the debts due and owing to the farm at the beginning of the year, as compared with those at the end of the year.

Finally the difference between money received from sales of produce and money spent out on things for the farm will give the remaining profit, provided the receipts are higher than the payments.

If all these three items which represent *profit* are added together, the *total profit* for the year is obtained.

It must not be forgotten that any produce, eggs and the like, used by the farmer's household, must be paid for to the farm. Account should be kept of all small payments made in cash by the farmer. These are known as petty cash payments and should be debited say once a month to the appropriate accounts. Often cash columns in the

STATEMENT OF ACCOUNT.

| | £ | s. | d. | | £ | s. | d. |
|--|--------|----|----|--|--------|----|----|
| To Valuation at Michaelmas, 1944 .. | 1,000 | 0 | 0 | By Sundry Receipts (Money received by Farm) | 650 | 0 | 0 |
| " Sundry Payments by Farm .. | £430 | 0 | 0 | " Poultry and Eggs used in House.. | 20 | 0 | 0 |
| " Sundry Payments by Petty Cash .. | 20 | 0 | 0 | | | | |
| " Wages of Daughter.. | 45 | 0 | 0 | " Valuation at Michaelmas, 1945 .. | 670 | 0 | 0 |
| | 495 | 0 | 0 | | 1,300 | 0 | 0 |
| | 1,495 | 0 | 0 | | 1,970 | 0 | 0 |
| Add Sundry Creditors at Michaelmas, 1945 (Money owing by Farm) | 32 | 0 | 0 | Add Sundry Debtors at Michaelmas, 1945 (Money owing to Farm).. | 49 | 0 | 0 |
| | 1,527 | 0 | 0 | | 2,019 | 0 | 0 |
| Less Sundry Creditors at Michaelmas, 1944 .. | .. | .. | .. | Less Sundry Debtors at Michaelmas, 1944 .. | .. | .. | .. |
| | 40 | 0 | 0 | | 50 | 0 | 0 |
| | 1,487 | 0 | 0 | | | | |
| PROFIT FOR YEAR .. | 482 | 0 | 0 | | | | |
| | £1,969 | 0 | 0 | | £1,969 | 0 | 0 |

NOTE.—Further analysis of receipts and payments can be made to suit individual cases.

pocket book are used for the purpose of keeping track of these small payments.

The simpler these accounts are kept the better, but it is well worth while to keep them and they need not take up too much time of the poultryman's working day.

GLOSSARY

Barred. A term used where feathers carry alternate stripes of light and dark colouring. This is best seen in the Barred Plymouth Rock.

Bloom. The sheen or glossy appearance on the feathers.

Brassy. Yellow tinted. Found often in breeds like the White Wyandotte.

Breed. The race or class of fowls.

Capon. A castrated male bird.

Comb. The red fleshy protrusion on the top of the head. Combs differ in different breeds as single (Leghorn), rose (Wyandotte), leaf (Houdan), pea (Game).

Condition. The health of the bird ; its general appearance.

Crest. A tuft of feathers on the head (Houdan breed), also known as "Top Knot."

Cushion. Term usually applied to the female bird, and refers to the feathers at the back and under the tail.

Cross Bred. The result of mating two distinct breeds together.

Dewlap. The gullet. Can be seen plainly in adult geese.

Dubbing. A term generally used for the cutting off the comb of single comb male birds.

Ear Lobes. The folds of skin hanging from the ears. The lobes differ in different cases in size, shape and colour. They are mostly cream, red or white.

Feather Legged. A term used where birds have feathers on the shanks (Faverolles).

Flights. The primary or long feathers of the wings. Used for flying, they are tucked out of sight when the wing is folded.

Fluff. The first feathers on a chicken. Also the soft downy feathers about the thighs of the adult bird.

Frizzled. A term used for curled feathers.

Hen. Usually used to denote a bird that has completed its first laying season.

Hackles. The narrow feathers growing on the neck. They are usually long and pointed. In the case of the male bird they can be seen on the saddle, and are known as saddle hackles.

Hock. The joint of the thigh with the shank, sometimes called the knee joint.

Horn Comb. A comb that is V-shaped (La Fleche breed).

In-Breeding. Breeding from related parents.

Keel. The vertical part of the breast bone.

Knock-Kneed. Term used of birds which have their hocks near together instead of well apart.

Lacing. An edging round a feather.

Leaf Comb. A peculiar shaped comb seen to best advantage in the Houdan breed.

Mottling. Spots of colour at the end of the feathers, as in the Ancona.

Muff. Feathers on each side of the face (see Faverolles).

Pea Comb. A kind of double comb.

Pencilling. Markings or stripes straight across or round a feather.

Primaries. See Flights.

Pullet. A term used for a bird in its first laying season. It remains a pullet until the first laying season is completed.

Rose Comb. A broad comb, nearly flat on top, as seen in the Wyandotte breed.

Saddle. The posterior part of the back reaching to the tail of the cock.

Secondaries. The long quill feathers of the wings, which can be seen when the wings are closed.

Self Colour. One colour, not mixed with any other.

Shaft. The quill part of the feather.

Shanks. The part of the leg below the hock.

Sheen. The bright gloss on feathers.

Sickles. The long curved feathers of a cock's tail.

Single Comb. A narrow comb having serrations and spikes, as seen in the Leghorn.

Spangling. Large spots of colour on the feathers different from that of the ground colour.

Spur. Horny substances growing from the shanks of the male bird near the heel. Occasionally hens will develop spurs.

Squirrel Tail. A tail which is carried high, bending over the back like that of a squirrel.

Sprigs. Small spikes on the side of a single comb. It is considered a defect.

Stag. A male turkey after reaching the adult stage.

Strain. A line of birds which have been specially bred, and in which some definite characteristic has been fixed.

Strawberry Comb. A comb that somewhat resembles a strawberry.

Tail Coverts. The curved feathers at the side of the lower part of the tail.

Tail Feathers. The long, straight and stiff feathers of the tail.

Thigh. The part of the leg above the hock and covered with feathers.

Type. All the parts of the fowl taken as a whole, and being in harmony, typical of the variety it represents.

Under Colour. The colour at the root of the feathers. The soft down or fluff that is seen when the bird is handled and examined.

Variety. The division of a breed known by its colour or markings. Wyandottes and Leghorns are examples.

Wattles. The flesh-like skin at each side of the base of the beak. The wattles are chiefly developed in the male bird.

Web. The skin between the toes, or the skin seen when the wings are extended.

Wing Bars. The two lines of short stiff feathers on the wing, covering the roots of the longer wing feathers.

Wing Coverts. The feathers covering the roots of the secondary feathers.

Wry Tail. A tail carried to one side, and not straight with the body of the fowl.

SOME USEFUL NOTES

How to hold a fowl when administering medicine. Take the fowl up and place it under the left arm, getting it well up, so that it is held by the upper arm and elbow. With the left hand that has been left free, open the mouth of the bird, and administer the medicine with the right hand. If the left foot is raised on a box whilst carrying this out, the job will be easier to perform.

Disposing of a dead bird. Always burn a diseased bird. It is much more satisfactory than burying it. A small amount of paraffin poured over the carcase will facilitate and make a clean job of the work. A home-made incinerator built either of bricks, or an old drum pierced in several places to create a draught is a useful adjunct to the poultry farm.

A hospital coop, cage, or small house, should be available on any poultry holding. If a fowl should appear to be unwell, take her away from the other birds, and isolate her for a few days. If it should turn out that she is suffering from an infectious disease, there will at least have been some attempt to save the other birds. Keep the hospital well away from the poultry houses, and see that it is kept absolutely clean and disinfected.

A medicine chest should be kept handy. Whilst it should always be the practice to destroy any bird that is obviously ill, unless there is some good reason for keeping it, there are occasions when a simple ailment or complaint can be quickly put right if the necessary medicines are to hand. The following might well comprise the medicine chest:—
Permanganate of Potash, Sulphate of Copper, Sulphate of Iron, Castor Oil, Epsom Salts, Vaseline.

The Permanganate, really a disinfectant, is generally used for "pinking" the water, if the weather is very changeable, or a cold is suspected. The permanganate crystals should be put into a hottle and water added to it. The solution which will then have a dark purple appearance, should be added to the drinking water until it just turns pink. Permanganate given this way is harmless. It is also useful in cleansing a wound caused by a rusty nail or piece of wire.

Sulphate of Capper added—in a small quantity, for it is a poison—to the drinking water is also a safeguard if colds are suspected. Do not use galvanized troughs.

Sulphate of Iron enough to cover a sixpence added to the trough of drinking water acts as a tonic where birds are in a poor condition.

Castor Oil and Epsom Salts should not be given to fowls as a matter of routine, as is sometimes done, but should be kept for use when really necessary.

Vaseline for applying to wounds of any description is a useful stand-by.

A lighted candle or match will discover a draught, but care must be taken in their use if litter is lying about.

A Box kept in the laying-house will be found useful for storing eggs during the day-time before the final collection is taken away in the late afternoon. Where trap-nesting is done, this is a necessity, but it is always advisable to remove eggs from the nest when possible. Leaving them lying around encourages egg eating.

Nests are better placed under the windows. The darker the position the better.

Galvanised Corn or Mash bins may be placed in each laying house if available, or in every alternate house. They save a lot of unnecessary tramping about, and can be refilled when food is being taken out all round the farm.

A Mincing Machine, the ordinary domestic machine, is a useful addition to the poultry plant, where only a few fowls are kept. House scraps and spare vegetables can be minced and will form quite a useful addition to the rations, with a saving in the food bill.

An Inverted jam jar in a saucer makes an excellent drinking fountain for young chicks.

Wire Netting for runs should be 5 ft. or 6 ft. high, 2-inch mesh, and 18 gauge if intended for fencing adult birds. For chicken runs, one inch mesh, two or three feet in height and 18 gauge is advised.

Posts for fencing may be of Chestnut, Ash or Oak. They should be dipped (treated with tar or creosote) before use and should be driven one foot or 18 inches into the ground.

Imported Deal, Larch, or Spruce Poles are very satisfactory for the best frame work in making Poultry houses. Uprights and horizontals should be 2 inches by 2 inches. For the large type of house the uprights should be 2 inches by 3 inches, and about 3 feet apart.

Boarding for the walls may be either tongued and grooved match-boarding, or weather-boarding.

Roofing should be of $\frac{3}{4}$ inch wood covered with a good make of roofing felt.

Roofs may be either of the lean-to or the gable type. Rafters for the former type run from 2 inches by 2 inches to 2 inches by 4 inches, according to the span, and in the gable type of house from 2 inches by 4 inches to 2½ inches by 6 inches.

Felt is sold in rolls. Usually these are some 36 inches wide by 12 yards long. Allowing for the necessary overlap of 3 inches a roll should cover about 120 square feet.

Corrugated Iron, which is sometimes used for roofing poultry houses, will make for extremes of temperature, very

cold in winter and hot in summer, unless it has an inner lining of boarding or straw. The latter will get verminous if a watch is not kept upon it.

A Thatch Roof is excellent for maintaining an equal temperature. For that reason it will often be used for roofing an incubation room. As stated above, it tends to harbour insects.

Earth Floors are inexpensive, but are not so much used as formerly. Even if built up above the surrounding ground, and well rammed, they still tend to get worked into holes by the continual scratching of the birds.

Wooden Floor Boards (tongued and grooved) should be at least 1 inch thick, the floor being supported on suitable joists 4 inches by 2 inches, and sleepers 4 feet apart.

A Concrete Floor is too cold for a laying house. It must be very thickly hedged down if used.

To Prevent Whitewash Rubbing Off add size. The proportion is about $\frac{1}{4}$ lb. of size to each 2 gallons. These should be mixed whilst hot.

Allow One Pound of paint per 25 square feet of wood to be painted. Two thin coats are better than one thick one. After the first two coats allow one half pound per 25 square feet for subsequent work.

Floor and Air Space per Bird.

| <i>Kind of House</i> | <i>Floor Space per Bird Sq. Ft.</i> | <i>Air Space per Bird Cubic Ft.</i> |
|---------------------------------|---|---|
| Breeding House | 2 | 12 |
| Intensive House and Deep Litter | 6 | 36 |
| Semi-intensive House | 4 | 24 |
| Roosting Shed with Scratching | | |
| Shed attached | 2 and 4 | 12 and 24 |
| Backyard Poultry House | 2 | 10 |

| | | |
|--------------|----|----|
| Backyard Run | 20 | — |
| Duck House | 4 | 16 |
| Goose House | 6 | 36 |
| Turkey House | 8 | 60 |

Birds to the Acre.
System.

Number to the Acre.

| | |
|-------------------------------------|------------|
| Free Range | 25 to 50 |
| Colony | 200 to 300 |
| Semi-intensive | 150 to 200 |
| Breeding Pens (with alternate runs) | 80 to 100 |

Pullets are birds up to 12 months old.

Yearlings are birds from 12 to 24 months old.

Hens are birds over 24 months old.

Timber can be bought in different widths but is always sold by the square of 100 square feet. Boarding 4 inches wide will contain 300 feet run in 100 square feet. Boarding 8 inches wide will contain 150 feet run in 100 square feet. Boarding 12 inches wide will contain 100 feet run in 100 square feet.

One pint of water weighs $1\frac{1}{2}$ lb.

One Truss of Straw weighs 36 lb.

One Truss of Old Hay weighs 56 lb.

One Truss of New Hay weighs 60 lb.

36 Trusses—one load.

One Load of Straw— $11\frac{1}{2}$ cwt.

One Load of Old Hay—18 cwt.

One Load of New Hay— $19\frac{1}{2}$ cwt.

One Acre—4,840 square yards.

A Great Hundred of Eggs—120.

One Gallon of Flour—7 lb.

Freezing Point—32° Fahrenheit, 0° Centigrade, 0° Reaumur.

Bolling Point—212° Fahrenheit, 100° Centigrade, 80° Reaumur.

SOME USEFUL NOTES

A Tablespoonful holds approximately $\frac{1}{2}$ oz. liquid or 1 oz. solid.

A Dessertspoon holds approximately $\frac{1}{4}$ oz. liquid or $\frac{1}{2}$ oz. solid.

A Teaspoon holds approximately $\frac{1}{8}$ oz. liquid or $\frac{1}{4}$ oz. solid.

Old Hens will make good prices if sold alive in the local markets at certain times of the year. These periods come in March-April, June and September. Local auctioneers will advise as to the exact days on which birds should be marketed.

Preserving Eggs. The best way known of preserving eggs is by the use of waterglass. Pure water should be boiled and one gallon mixed with one pound of waterglass. This mixture, which is enough for 100 eggs, must be allowed to cool before use. The eggs to be preserved must be new laid, and by this is meant eggs between 2 and 4 days old, not warm eggs fresh from the nest. The eggs must be clean, and if necessary wiped with a damp cloth and then dried. Eggs with cracked shells must not be used. Thin shelled eggs will absorb the waterglass causing the egg to go bad, and affect the other eggs. If the solution is too strong the eggs will float and more water must be added. If, sometime after the eggs have been put down, one is seen to float, it should be removed, as it is probably not keeping. Use a pail or crock and pack the eggs carefully in to it, the pointed end downwards. Then pour the solution over the eggs and see that the top layer of them is well covered. The solution should come a few inches above the top layer of eggs to allow for evaporation. Cover the receptacle to keep out the dust, but do not make it airtight. Examine the eggs from time to time and if the level of the liquid has fallen add cold water. This method is cheap, simple and effective. It is generally said that eggs will keep for 12 months when treated in this way. It has, however, been

found that they will keep for well over that time, up to two years.

The Poultryman may be told sometime to give a dose of medicine of a certain strength, or so much of a certain solution of anything. If a 10 per cent. solution is ordered, it means that of 100 parts of the mixture when made up, 10 parts are of the medicine ordered. To prepare a 10 per cent. solution, put 10 ozs. of the medicine into a pint measure and fill the measure up with water. Pour the whole into a basin. Now a pint measure will take 20 ozs. of the liquid so the mixture so far is 10 ozs. medicine and 10 ozs. water. Add 4 more pints of water, totalling another 80 ozs., and you have 10 ozs. medicine in 90 parts of water or a 10 per cent. solution.

To make up a 10 per cent. solution of a solid substance, weigh out two ounces of the solid and place in a glass pint-measure with some water. Stir until the solid is dissolved, then fill up to the pint-mark with water.

Dead Weight. A term used in respect of a bird that has been killed and all feathers and stubs removed. In this condition fowls are sold in the wholesale markets, though some firms will also take the birds alive and make a charge for killing and plucking.

Dressed Weight. A bird is usually sold dressed weight to retail customers and occasionally to the shops and restaurants. In this case the bird is plucked and all offal removed, i.e. head, feet, intestines, etc. The edible offal, i.e. those parts known as the giblets—gizzard, liver, heart and neck—are included in the weight of the dressed carcase. The following figures show the approximate amount of feathers in respect of birds of various weights.

Birds weighing Live-weight 2 lbs. Weight of feathers, 2½ ozs.

Birds weighing Live-weight 3 lbs. Weight of feathers 4 ozs.

Birds weighing Live-weight 4 lbs. Weight of feathers 4½ ozs.

Birds weighing Live-weight 5 lbs. Weight of feathers 6 ozs.

Birds weighing Live-weight 6 lbs. Weight of feathers 6 ozs.

Weights of Three Chickens at Different Stages of Preparation for Table (Rhode Island Red × Light Sussex) (lbs. and ozs.).

| Dead Weight lbs. ozs. | Head & Feet. | Inedible Offal. | Giblets. | Empty carcase. lbs. ozs. | Carcase after cooking. lbs. ozs. | Bones. | Flesh edible lbs. ozs. |
|--------------------------|--------------|--------------------|----------|--------------------------------|---|---------|------------------------------|
| 2-12½ | 5½ ozs. | 5 ozs. | 4 ozs. | 1-14 | 1-10 | 8½ ozs. | 1-1½ |
| 3-13½ | 7½ " | 6½ " | 5½ " | 2-10 | 2-5 | 14 " | 1-7 |
| 4-2½ | 8½ " | 4½ " | 6½ " | 2-15½ | 2-8 | 11 " | 1-13 |

To Dress a Fowl. This will involve two operations, drawing and trussing. First deal with the sinews. Make a cut across the shanks in front, down to the bone, bending the feet over until the shank bone breaks. Tie a strong piece of string or wire around the shank just above the foot and attach this to a hook in the door post or wall. Hold the bird securely and pull the leg down. The foot and sinews will be left hanging.

Next take off the head and neck. Place the bird breast downwards cut up the skin at the back of the neck from the shoulders. Draw the skin back and cut through the neck joint close to the shoulders, so as to leave no neck-bone showing. Do not, however, cut through the skin on the lower side, as this will be required as a flap to cover the stump of neck remaining. The neck can now easily be pulled away and should be put aside as part of the giblets. Remove the head, cut off the remnants of wind pipe as far in as possible, and also remove the crop from the surrounding flesh.

Before leaving this part of the bird, introduce a forefinger into the cavity, working it round and loosening the organs as far as possible.

Now turn the bird over, and make a slit with a sharp knife between the "parson's nose," or tail joint, and the vent. This must be done carefully so as not to rupture the intestines. Pass the forefinger through this slit and loose the intestines. Then with two or three fingers feel for the gizzard, and grasping it pull steadily. If the loosening has been done properly, the gizzard, liver, gall bladder and intestines will all come out together. The lungs which are close up to the backbone will probably have to be removed afterwards.

For Trussing. A trussing needle about two inches long and some string will be needed. There are several ways of doing this. A simple way, easily followed, is this :

Place the bird on its back with the vent towards the operator. Press the legs well down, then pass the needle through the thigh, right through the body, and through the second thigh. Turn the bird over and turn or twist the pinions inwards so as to point towards each other over the back. Now pass the needle through the wing bone near the centre, through the flap of skin covering the neck cavity, picking up the skin on the back at the same time, and finally through the second wing. Tie to the end of the string left loose.

Thread the needle again, pass through the leg joint above the back through the skin at the end of the keel bone and through the other leg. Take both ends of string, cross and tie around the "parson's nose," drawing the legs down as the knot is tied.

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